WORKING PAPER

Socio-economic considerations for land-use planning

The case of Kapuas Hulu, West Kalimantan

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Working Paper 120

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Photo by Yves Laumonier. Women of Keluin Hamlet are preparing the land.

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Table of contents

List of figures and tables

Figures

Tables

Abbreviations and acronyms

ADB	Asian Development Bank
ADD	*Alokasi Dana Desa*, a village allocation fund provided by the district government for village development including operational costs
APDS	*Asosiasi Periau Danau Sentarum*, Danau Sentarum honey collectors, association
APL	*Area Penggunaan Lain*, area for other use
BKNP	Betung Kerihun National Park
BPS	*Badan Pusat Statistik*, Indonesia statistics agency
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CWSHP	Community Water Services and Health project conducted by the Ministry of Health with support from the Asian Development Bank
DAK	*Dana Alokasi Khusus*, a special allocation fund received from central government for special purposes such as, but not limited to, reforestation
DAU	*Dana Alokasi Umum*, general allocation fund received from central government
HH	Household
HP	*Hutan Produksi*, production forest
HPK	*Hutan Produksi Konversi*, production forest for conversion
HPT	*Hutan Produksi Terbatas*, limited production forest
KOMPAKH	*Komunitas Pariwisata Kapuas Hulu*, Kapuas Hulu ecotourism community
NP	National Park
NTFP	Non-Timber Forest Product/s
PAD	*Pendapatan Asli Daerah*, district income originated from local taxes, fees and other incomes
PES	Payment for Ecosystem Services
PNPM	*Program Nasional Pemberdayaan Masyarakat*, national program for people empowerment, a project managed by BAPPENAS with support from the World Bank to improve access and poverty alleviation
RTRWK	*Rencana Tata Ruang dan Wilayah Kabupaten*, district spatial plan
TFCA	Tropical Forest Conservation Act, a special program implemented by the US government through a billateral agreement with eligible countries including Indonesia to achieve forest conservation through a debt for nature swap mechanism
WWF	World Wildlife Fund for Nature

1. Introduction

This report provides a summary of the main findings of the socio-economic survey conducted in Kapuas Hulu District, West Kalimantan as part of the CoLUPSIA project[1]. The purpose of the study was to provide an understanding of the socio-economic conditions, the drivers for land-use change and economic development, and the cultural and social characteristics which are essential to ensuring that land-use decisions are taken to optimize economic, social and environmental outcomes.

The survey comprised four pilot areas, chosen because they represented the spectrum of land-use activities and biophysical conditions found in the region. The pilot areas are:

- Pilot 1, to the north of Danau Sentarum National Park, bordering Malaysia, represents a landscape claimed to be as "the biodiversity corridor"[2]
- Pilot 2, in the upstream region of Kapuas River, bordering Betung Kerihun NP, represents a remote upstream area adjacent to a national park
- Pilot 3, in the south of Kapuas Hulu, represents an area with improved infrastructure along the southern main road, and
- Pilot 4, in the west of Kapuas Hulu, bordering Sintang District and Malaysia, represents an area newly exposed to oil palm plantations.

Through the use of household, village and key informant surveys together with focus group discussions, the CoLUPSIA socio-economic team researched the socio-economic conditions facing communities and individual households across the four pilot areas in Kapuas Hulu. Identified using a random sampling approach, 876 households were surveyed in 22 villages. This represents 7.2% of the total villages in Kapuas Hulu.

This report uses the findings of the study to explore the social and economic dynamics of Kapuas Hulu in relation to the use and local dependency on natural resources. It highlights the key socio-economic factors, drawing on the information gathered from the socio-economic surveys at the pilot level. A detailed description of each pilot area can be found in the annexes of this report. Lessons drawn from this analysis will be used to inform the development of collaborative land-use planning tools and decision making processes and where possible in the development of Payment for Ecosystem Services (PES) options.

1 COLUPSIA is an EU funded project managed by CIRAD in partnership with CIFOR

2 http://wwf.panda.org/?209387/Corridor-Restoration-Together-with-community-to-answer-the-challenge-of-climate-change; last accessed on 8 October 2013

2. Introducing Kapuas Hulu

2.1 Demographic overview of the Kapuas Hulu District

The total population of Kapuas Hulu is 218,804 people (BPS, 2009) and has a population density of approximately seven inhabitants per km^2. Putussibau Selatan sub-district, which includes the town of Putussibau (159 inhabitants/km^2), has the highest population density and Embaloh Hulu sub-district has the lowest (1 inhabitants/km^2). The population across Kapuas Hulu is relatively young and expected to grow in forthcoming years. The majority of the population, 60%, is of productive or working age (15 years to 64 years).

Kapuas Hulu is ethnically and culturally diverse. In general terms, the population can be classified as Malay and Dayak. However, the Dayak are distributed across the district and consist of 20 sub-ethnic groups and 20 languages (Institute Dayakologi, 2008).

While the majority of the population has access to basic education, 35% of the population does not hold any form of education certificate. As the level of qualification increases the frequency decreases sharply, with only 4% of the population graduating from higher education. A lack of teachers and poor infrastructure are contributing factors to the low levels of formal education.

Poor infrastructure is represented by the quality of road and its distribution. Asphalt roads cover only 26% of the total road length which has good access throughout the year. Other road classes, i.e., gravel and dirt are passable but sometimes difficult to access especially during the rainy season. River transportation remains an important means of mobility and is also used for economic activities. The use of river transportation coupled with poor road infrastructure has caused high economic costs and affected the price of goods and services.

Employment is diverse in the district although 80% of the population is still involved in the agricultural

Table 1. Percentage of certificates obtained and level of education.

Highest certificate	Male	Female	Total (M+F)
No certificate	33.55	37.28	35.3
Elementary school	28.4	29.11	28.7
Junior high school	19.4	18.1	18.8
Senior high school	13.04	10.8	11.97
Vocational high school	1.62	1.09	1.37
University	3.8	3.5	3.7

Source: Kabupaten Kapuas Hulu dalam angka (BPS, 2009)

Table 2. Type and length of roads in Kapuas Hulu District.

Road classification	Length (km)	Percentage of Total (%)
Asphalt	226,575	26
Gravel	251,964	29
Dirt	379,475	43
Unclassified	26,060	3
Total	884,074	

Source: Kabupaten Kapuas Hulu dalam angka (BPS, 2009)

Table 3. Percentage of the population by occupation.

Economic sector	Male	Female	Total (M+F)
Agriculture	72.54	83.84	77.56
Mining and quarrying	7.18	1.6	4.7
Processing industry	1.04	1.29	1.15
Electricity, gas and water	0.14	0	0.08
Construction	2.23	0	1.24
Trade, hotel and restaurants	4.72	7.02	5.74
Transportation and communication	1.17	0.16	0.72
Financial institutions and other services	10.98	6.09	8.8

Source: Kabupaten Kapuas Hulu dalam angka (BPS, 2009)

sector. This is followed by service and trade sectors at roughly 9% and 6%, respectively.

In the agricultural sector people generally manage land using traditional methods, practicing shifting cultivation to grow crops such as paddy, maize, cassava, tubers and vegetables. The agricultural land acquired by clearing forest or secondary forest is reinstated after several seasons use. Perennial crops, mainly rubber, provide a ready source of cash income and are often grown to supplement other crops such as pepper, fruits and *tengkawang* nuts. The forest is very important for the people in Kapuas Hulu especially for food (meat, fruits and vegetables), medicines and traditional crafts (baskets and mats). In general, although economic activities in the district and rural areas are considerable, subsistence activities still play a central role, for instance, food provision from shifting agriculture, fishing and the gathering of forest products.

2.2 Environmental and land-use overview of the Kapuas Hulu District

Kapuas Hulu, covering an area of 31,162 km^2, has unique environmental characteristics. In 2003[3], the district was designated a conservation area. The district has two national parks, Danau Sentarum and Betung Karihun, which together with the Kapuas River provide vital ecological services to the people of Kapuas Hulu and also to the wider population of West Kalimantan. The area is nationally and internationally significant, this is demonstrated by a profusion of projects that are currently working to study and support the region.

In Kapuas Hulu, forest designated for conservation and watershed protection comprises approximately 57% of the area of the district, in contrast to the whole of West Kalimantan, which stands at about 26%. The two national parks occupy about 30% of the area (i.e., Danau Sentarum National Park and Betung Karihun National Park). The area designated as production forest, including limited production forest (HPT) and conversion forest (HPK), occupies about 25% of the district. The revised spatial plan

Table 4. Kapuas Hulu forest area and status.

Forest land classification	Land area (ha)	Percentage (%)
National park	925,135	30
Protected forest	832,390	27
Peat protected forest	1,750	0.06
Limited production forest	485,495	16
Production forest	174,440	6
Production forest for conversion	109,065	3
Area for other uses	600,525	19
Total	3,128,800	

Source: Forestry statistics 2009

(RTRWK) of 2011 proposes that land allocated for alternative use (APL) be increased in excess of the initial of 19%. In practice, this implies that this land is available for agricultural development, in particular for the establishment of oil palm plantations.

Oil palm plantations have expanded across West Kalimantan in recent years and are now advancing across Kapuas Hulu, with land under development/establishment for oil palm plantations spreading from the east of the district, moving to the south towards and around Putussibau and to the north into the "biodiversity corridor" between the two national parks. The potential impact of the growth of oil palm plantations remains unclear and presents a major challenge to the district, which is faced with the need to mitigate the impacts of economic development whilst maintaining ecosystem services, and preserving the environmental and social functions that they provide.

Development has introduced changes and brought new pressures, which have influenced the long-established interactions between the people and their landscape. These are having far-reaching impacts for both people and place. The unique, but now often delicate conditions have implications for the present and future viability of livelihoods (individuals, communities and the private sector) and the sustainability of natural resources. As a designated conservation district, the District Government of Kapuas Hulu has made commitments to conserve its natural resources, but the challenge is to ensure that this can be done while creating economic development that ensures poverty alleviation and supports the needs of the local population.

3 The district government voluntarily declared Kapuas Hulu a conservation district, which was formally endorsed by the District Head (Bupati) decree No. 144/2003. The purpose of the decree is to provide guidelines for stakeholders to manage natural resources optimally while considering ecosystem balance and prevent environmental damage.

2.3 Investment and district level finance

Investments in the district are mainly related to land-based investments. According to provincial forestry statistics (2009) there are seven forest concessions working in Kapuas Hulu District, but among these there are only three active companies with reported timber extraction. In addition, there are several oil palm plantations, which have started their operations (land clearing, planting and harvesting). Despite its contribution to the local economy it is still unclear whether the economic benefits of oil palm outweigh the impact on the environment.

Internally, development is also financed by the district budget. As seen in the other districts in Indonesia, the district budget depends mainly on a decentralization budget from central government. It consists of general allocation funds (DAU), natural resource sharing, and tax sharing which accounts for about 83%, 10% and 5%, respectively. As the district is already decentralized, it is allowed to generate its district income known as PAD. PAD consists of district tax, retribution and management of district assets, and from other legal sources.

As a source of district income, the role of PAD is important. The proportion of PAD in the district budget decreased significantly by about 80% in 2009 compared with the 2007 figure. This was due to a significant decrease in income from the account of other legal sources. Consequently to maintain adequate budget for managing the government program and covering the gap between income and expenditure, the decentralization fund had to increase about 14% in 2009.

By examining the composition of the district budget it is evident that the district relies very much on central government coupled with private sector investment to maintain economic growth. In relation to issues arising from being a dedicated conservation district, the district struggles for compensation, which has been ineffective in both policies and practice, as indicated by, among others, approving and allocating land-based investment in oil palm in the area.

Table 5. Kapuas Hulu District income budget (in million Rp).

Description	2007		2008		2009	
	Amount	%	Amount	%	Amount	%
A. District own Income, PAD	30.962	5.2	17.034	2.6	6.117	1
District tax	753	0.1	951	0.1	575	0.1
Retribution	1.725	0.3	4.171	0.6	2.500	0.4
District asset management	1.401	0.2	1.673	0.3	1.500	0.2
Other legal sources	27.083	4.6	10.239	1.5	1.542	0.2
B. Decentralization Fund	544.042	92.1	629.785	94.9	619.905	97.4
Tax sharing	45.224	7.7	41.147	6.2	34.008	5.3
Natural resource sharing	-		12.640	1.9	60.386	9.5
General allocation fund (DAU)	458.779	77.6	516.446	77.9	525.511	82.6
Special allocation fund (DAK)	40.039	6.8	59.552	9	-	
C. Other legal income	15.930	2.7	16.478	2.5	10.344	1.6
Donation Fund	189		66		145	
Emergency fund	6.000		6.500		-	
Tax sharing from province/other districts	6.290		7.905		3.500	
Adjustment fund	1.846		2.007		-	
Financial assistance from province/other districts	1.605		-		6.699	
Other income	-		-		-	
Total Income	**590.934**		**663.297**		**636.366**	

3. Introducing the pilot areas

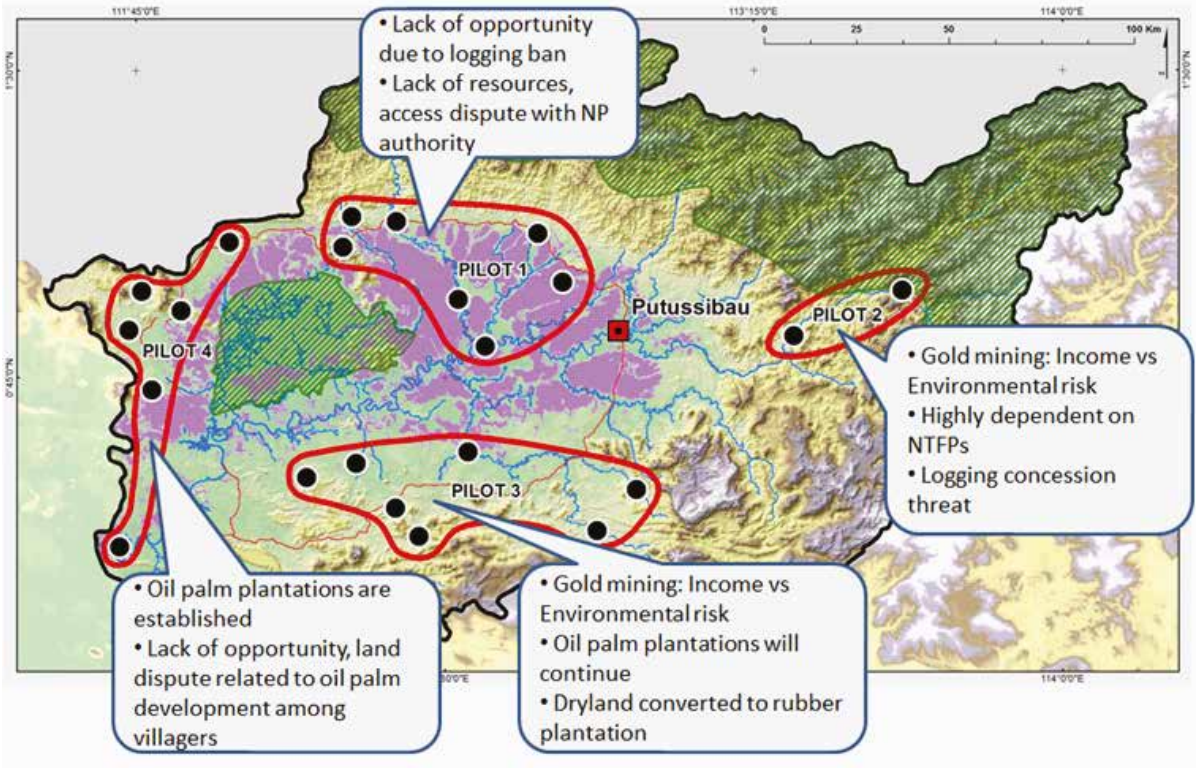

Figure 1. Kapuas Hulu pilot areas with highlighted critical issues.

The four pilot areas present varying biophysical traits that are reflected in the socio-economic activities. Across all four pilot areas, communities are faced with the land-use challenge of balancing the provision of subsistence food and resources with economic development through income generating activities such as the production of rubber and mining activities. All pilots are characterized by young and growing populations, which continue to assert further demands on the natural resources available to the communities.

Pilot 1 is located within the boundaries of two national parks, where land is more restricted as communities face unclear boundaries with the Betung Kerihun NP to the north and Danau Sentarum NP to the south. These communities are heavily dependent on the forest resources for timber (although access and logging is restricted to cultural use only, in most cases) and for non-timber forest products (NTFPs). Rubber production and other agroforestry commodities are also important, as is fishing. Employment opportunities are relatively limited, mainly Government roles such as education, and there is some employment as traders and merchants. Oil palm development is being established to the east of the pilot area. Some communities are supporting the development, with the prospect of development and employment opportunities, lacking since the demise of the timber concessions. Others are less receptive, fearing that the negative impacts of logging operations in the past may materialize under the oil palm plantations. This, in some cases, is a source of conflict between villages over land-use and access[4].

4 Clerc, J, 2010, Unpacking tenure security: development of a conceptual framework and application to the case of oil palm expansion on customary land in Kapuas Hulu regency, West Kalimantan, Indonesia. Master Thesis. AgroParisTech - ENGREF

Pilot 2 located to the east of Putussibau is part of the upper Kapuas River basin, bordering the Betung Kerihun National Park. The villages in this pilot area are heavily dependent on natural resources, with relatively limited options for economic development available to them, when compared to the other pilot areas. These villages are traditionally dependent on the forest resources for timber and NTFPs. Income from timber has declined considerably since the moratorium on logging.

Gold mining is economically important activity in Pilot 2; with agricultural practices predominantly focused on subsistence farming. Rubber production is less prevalent in this pilot than other pilot areas. Fishing is domestically and commercially important. The main issue facing communities and the government is the level of mining activity in the area, which has many serious environmental and social impacts. It causes sedimentation and pollutes the water, which are detrimental to the ecosystem and human health. However, it does provide a significant source of income for which there are few alternatives.

In the south, Pilot 3, an area of relatively lowland and hills in the south and south east, represents a unique biophysical area in Kapuas Hulu. Communities are more dependent on rubber production and gold mining, than in other pilot areas, and to some extent less dependent on forest resources. Dryland farming, predominately for subsistence foods, coupled with rubber production is the main land-use. Paddy and vegetable gardens are relatively limited, with communities able to buy agricultural produce from neighboring villages using the cash earned from rubber, mining, and increasingly employment with oil palm plantations, as there are generally reasonably good road networks. But there are villages, which have difficult access such as Nanga Dua. Mining, both river and land based, is a main source of economic revenue, resulting in the same negative environmental impacts discussed in the Pilot 2 area. Timber production is now minimal, having in the past been more prolific. This pilot area is, in some respects, more economically developed, with income from employment and rubber outweighing subsistence farming and NTFP processing.

The Pilot 4 communities are more developed than the other pilot areas in terms of reliance on paid employment and less on subsistence agriculture and directly on forest resources. Historically, local young males migrated to Malaysia to work between the planting and harvesting seasons as there was little in the way of employment in their villages. This area was also actively engaged in the timber trade between Kapuas Hulu and Malaysia in the 1990s, and, although the environmental impacts of this trade were negative (and extensively documented), it did create employment opportunities for local communities. The recent development of oil palm plantations, some of which have been established for more than 3 years and are now producing yields, is seen as a positive source of employment and economic development, by many of the communities. The potential negative impacts on the environment, in particular in relation to Danau Sentarum, are not well documented as yet. Mining, rubber production, subsistence agriculture, harvesting NTFPs and other employment opportunities continue to play important roles as sources of livelihoods.

4. Household income across the pilot areas

Across the four pilot areas the total household income was clustered from the bottom to medium range of the income group as shown in Table 6, which indicates the quartile bands of income across all pilot areas. The table reveals that household income is disproportionately distributed, that is, 50% of household income is between Rp17–Rp35 million per year, whereas the top quartile range shows a major income gap between the lowest and the highest (Rp35–Rp182 million). In addition, there are a number of households whose income is very low, less than Rp17 million per year.

Despite this range Figure 2 shows the narrow distribution of the frequency of household income suggesting relative equivalence between the incomes of the majority of households in the area.

Figure 3 breaks down the quartile bands of household income by pilot area. It is apparent from these results that the largest inequalities in household income exist especially in Pilot 2. The percentage of the population in Pilot 1 which has the lowest 25% of household income is the highest among the population in other pilots. While the top 25% of household income is earned by 45% of the population in Pilot 2 which is the highest of all pilots. The distribution of income in Pilot 3 is more

Table 6. Representation of incomes in Kapuas Hulu District.

Quartile	Household Income (Rp x1,000)	Number of HH
Lowest 25 %	<17,485.4	219
Second 25%	17,485.4 - 24,636	219
Third 25%	24,637 - 35,104.4	219
Top 25%	35,104.5 - 182,880	219
Total		876

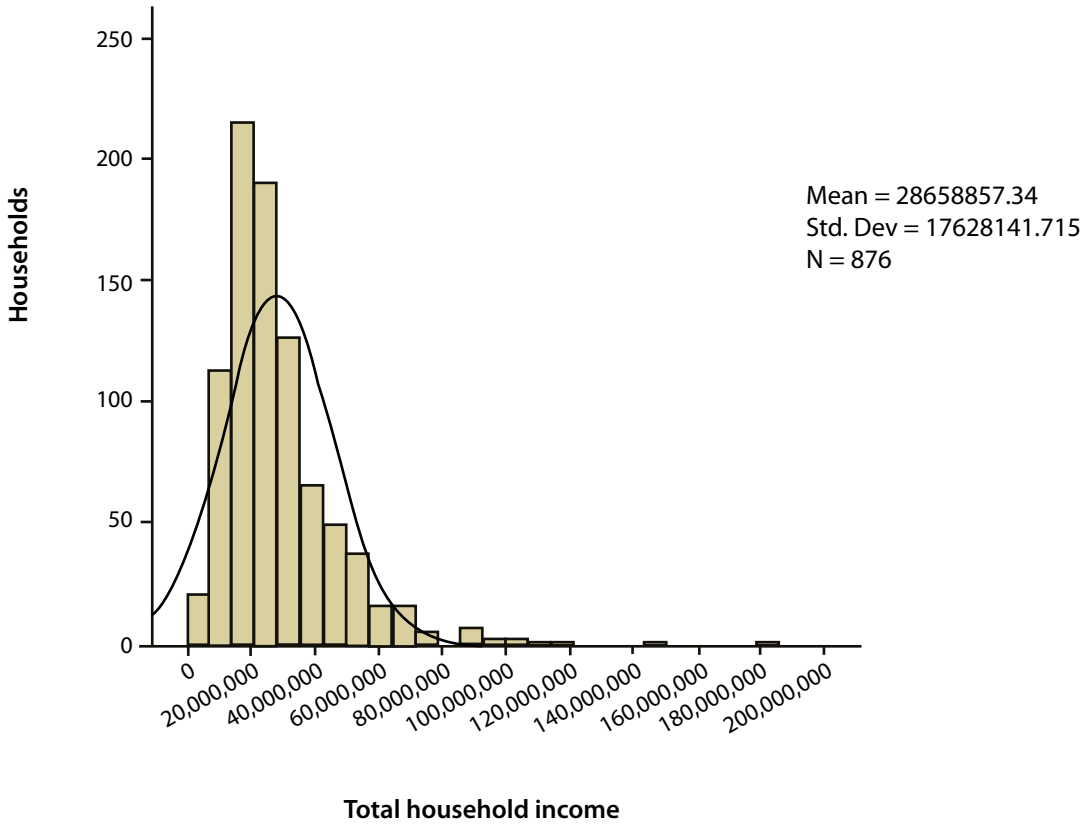

Figure 2. Distribution of total cash income across all households in Kapuas Hulu.

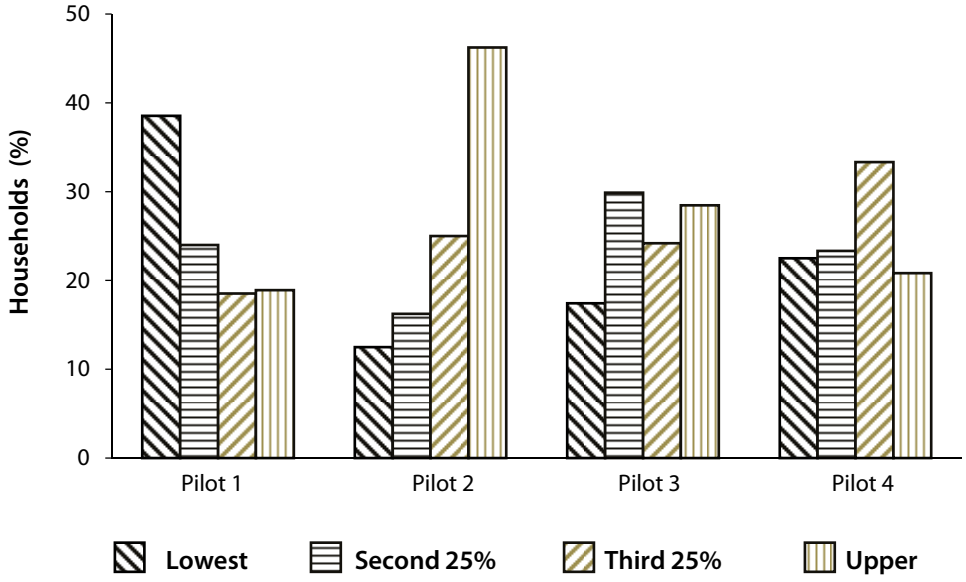

Figure 3. Representation of household incomes by pilot area.

diverse across income classes and Pilot 4 exhibits perhaps the most even distribution of household income, although this includes the second highest population of the lowest incomes, after Pilot 1.

4.1 Sources of household income

Across all of the pilot areas there is a diverse range of activities that generate household income. Key areas for income generation include agriculture, cash crops such as rubber, mining, timber, and the collecting and processing of NTFPs. This diversification of income is explored in the results of the socio-economic survey (Figure 4) and discussed at length in subsequent sections and annexes of this report.

Figure 4 and Figure 5 indicate that across Kapuas Hulu the highest level of engagement is in agriculture, which is important for subsistence and as a source of income (which is evident from the ratio of people's involvement and income generated in comparison with other sectors). Gold mining is the highest single source of income, followed by rubber tapping, other jobs and from employment on oil palm plantations. Husbandry indicates relatively high levels of engagement in the activities for the level of financial returns, which suggests that this activity is conducted, at least in part, for domestic use. Harvesting forest products (timber and non-timber) and fishing are conducted by a smaller number of people, but are still an important supplementary revenue stream as well as being important domestically.

The breakdown of sources of income including cash and subsistence by pilot area in Figure 5 indicates significant variation across the pilot areas. Agriculture, in the form of perennial crops, is an important source of household income across all pilot areas, as is the cash revenue generated from fishing and timber harvesting. Although there are similarities in sources of cash income there are also significant local differences. The revenues from gold mining dominate household income in Pilot 2, as it does in Pilot 4 and then it is the second biggest contributor to household income in Pilot 3. Revenue from oil palm is larger in Pilot 1 than Pilot 4. However, in Pilot 4 oil palm employment is more important with around 51 households involved in the industry (Figure 4). In Pilot 1, only two households in Tanjung Beruang are employed on an oil palm plantation close to the village (see Figure 5).

4.1.1 Rubber

Rubber tapping and latex production remains a quick and easy way to generate significant income in all areas. In Pilot 1, rubber tapping accounts for between 30 and 80% of household income (Rp12.9 million/HH/year on average). In other Pilots, the share of income ranges from Rp5 million to Rp23 million per household per year on average. This range can be explained by the fact that some farmers only tap rubber when they need cash, while others tap extensively for a living. The extensive planting of rubber is due to the potential cash income that can be generated.

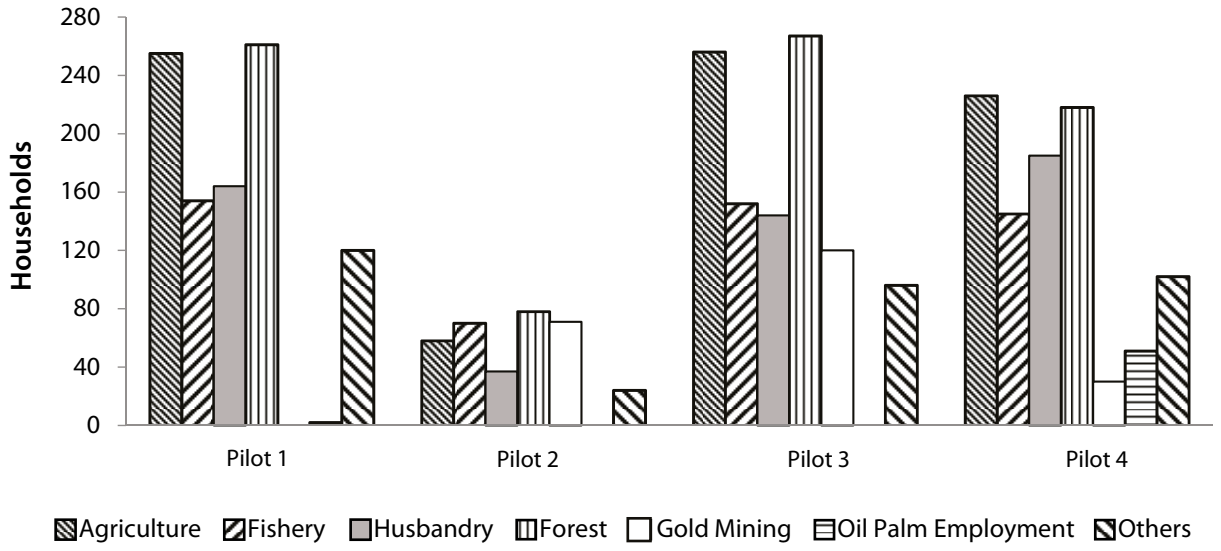

Figure 4. Household engagement in sources of income (HH).

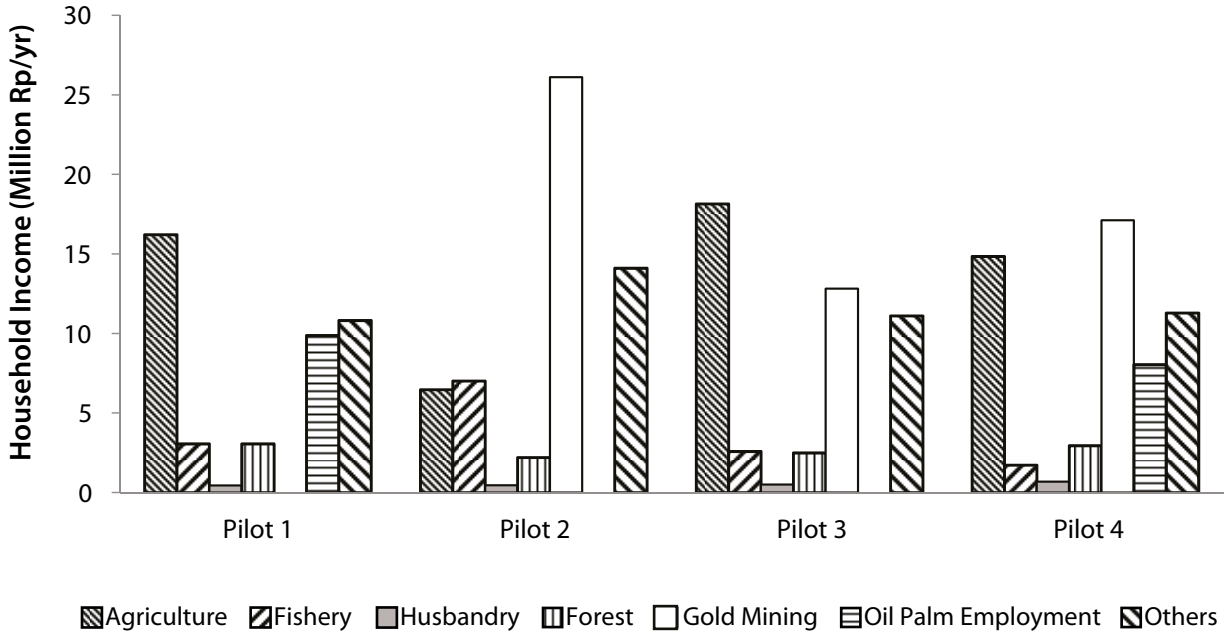

Figure 5. Average household income by activities and pilot sites (Rp/HH/year).

In Pilot 3, the annual income from rubber has a maximum of Rp23 million and an average of around Rp17 million per household. In the areas where there is no gold mining, as in the village of Hulu Pengkadan in Pilot 3, rubber has become the main source of cash income. The household involvement, related to rubber-tapping activities, ranges from 72% to 100% ofthe total village population.

4.1.2 Oil palm

Plantations are labor intensive, especially during establishment. Neighboring villages commonly provide the labor required. For a daily laborer, companies pay in the region of Rp39,000 per day, with wages being paid twice a month. Overall, the lowest income from oil palm is in Seriang at about Rp1.5 million per household per year (10–25% of

non-farming income) and the highest in Tinting Seligi is about Rp13.2 million per household (50% of non-farming income). Oil palm plantations have provided a new source of wage labor for local people in Pilot 1 and Pilot 4.

Following the opening of a new plantation, the company should ensure the concession is free from any land claims. In many cases, including in Kapuas Hulu, the area designated for plantation mostly overlaps other land-use mainly for agriculture.The company should compensatethe community who use the land. In Kapuas Hulu, the company paid Rp 250,000/ha. In the case of land that has not been utilized or is owned communall, the compensation is paid to the village then distributed equally to all members of the community. This compensation is paid once upfront at the beginning of operations.

4.1.3 Mining

Mining is an important income source across areas of Kapuas Hulu. As seen in Figure 5 gold mining is an established and major part of household income in all of the pilot areas with the exception of Pilot 1. It is seen as an attractive and accessible way to generate income, for example in Pilot 2 it was practiced by 90% of our surveyed households. However, these benefits are not without costs as the methods of gold extraction are a source of environmental degradation and a risk to human health, whilst also being seen as illegal in many cases, by district authorities.

4.1.4 Agriculture and fishing

Food crops generate a low income, but are grown by the majority of households. The crops are predominately for subsistence where common staple foods include rice, maize, various vegetables such as eggplant and spinach, as well as a variety of fruits. Most of the harvest is consumed by households who are responsible for their cultivation with only surplus production sold at local markets, where access to the market is permitting (Figure 6). For example, in Benuis (Pilot 3), income from agriculture is quite extensive relative to other villages,which can be attributed to better access to the local market in Selimbau. Selimbau plays a role as community port and exchange point for goods from inside and outside Danau Sentarum NP. In addition, people also grow perennial crops, mostly rubber, that provide long-term cash income. Other crops such as coconut and pepper are also found in Pilot 1 and Pilot 4.

There are indications that communities are moving away from a largely subsistence agriculture driven economy toward a cash economy. In Temenang (Pilot 3), for example, while land stock has remained

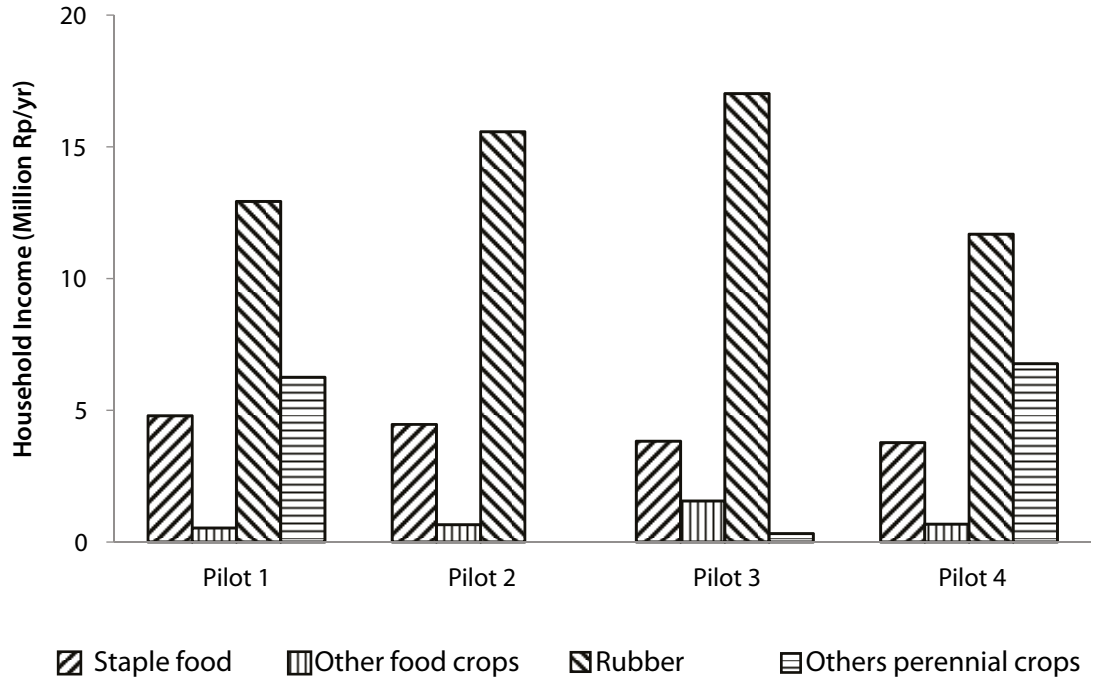

Figure 6. Average income from agricultural activities per pilot area (Rp/HH/year).

Note: Income includes cash and subsistence income

unchanged most people have converted land into rubber plantations.

4.1.5 Timber

Timber is an important resource used in construction by local communities. As seen in Figure 5 above, it is also an important source of household income. There is often an uneasy relationship with using timber as a source of financial income, particularly for commercial logging. On the one hand, previous concessions in the region caused significant environmental degradation and social issues, resulting from conflict over land-use and access. This remains very much in the memories of many of the communities. On the other hand, logging companies were a source of employment. Despite logging bans the infrastructure abandoned by the logging companies has been utilized by local communities. For example in Pilot 3, which sees the highest household income from timber harvesting, it has been used to fell rare and commercially prized species such as *Belian*. Timber extraction has fed small timber industries in the region to meet the local demand for furniture and wood products. This is particularly evident in the village of Nanga Embaloh in Pilot 1 where furniture workshops use the timber collected from the former concession. Timber remains the main forest product and can generate significant income, although the number of people who harvest timber is less than for NTFP collection. Timber income ranges from Rp1.5 million to Rp7million per household per year across the district and represents an important source of income for villages particularly in Pilot 3 such as Sriwangi, Nanga Boyan and Hulu Pengkadan.

4.1.6 Other forest resources and NTFPs

The collection of NTFPs is still an important source of livelihoods in the Pilot 3 site. There are valuable NTFPs that are often collected such as *gaharu* and *tengkawang* nuts. *Gaharu* or agar wood is a dark resinous heartwood that forms in *Aquilaria* trees when infected by a fungus. It is commonly used for fragrance, incense and perfumes, which are sold regionally. Five households reported generating income from *gaharu* in Tanjung village. They work in groups of 4-8 people and generate nearly Rp37 million annually or an average of Rp6 million per household.

Aquilaria has been submitted to appendix II of CITES (species status is "threatened"). *Aquilaria* in its natural habitat has been depleted as indicated by the increased distance travelled to gather it. *Gaharu* contributes significantly to household income and if the resource is depleted in its natural habitat there will be further implications for the stability of the local economy. A rehabilitation program is underway, initiated by the forestry agency which has been distributing *Aquilaria* seedlings to communities across the district.

Rattan is traditionally used for subsistence, however, many skills and techniques have, over time, been lost. During the Soeharto era the local government gave the villagers in Belatung (Pilot 1) a course to develop their skills in the making of rattan mats (*lampit*). The course also included marketing.

Currently, the local community sells the *lampit* locally, but in the past they were exported to Sarawak (Malaysia). The raw material is now difficult to obtain due to over exploitation. This has resulted in insufficient raw materials to meet the market demand. In an effort to overcome the lack of raw materials, the producers are frequently forced to use different rattan species of a lower grade.To address this problem the local communities are now planting high quality rattan in their village gardens.

Tengkawang nuts (*Shorea* spp.) are also important for rural Kapuas Hulu. They are a valuable species used by pharmaceutical and cosmetic industries. Trees do not fruit every year so people harvest it once every 2–4 years and collect around 200–500 kg/HH which is then sold in local markets at a price of approximately Rp8,000 /kg.

4.1.7 Other livelihood and non-farming income

Rural livelihoods in Kapuas Hulu revolve mostly around agriculture, fisheries, husbandry or forestry. People also engage in other jobs available in the village. There are also other income opportunities such as in local business as traders and merchants at the village level (small shop, etc.), gold mining and traditional crafts, as well as wage labor for migrant workers and oil palm employment. The government also employs a number of local people in community service positions.

Figure 7 reveals that gold mining, local businesses and community services are the most common livelihoods across the pilot sites. While a variety of jobs are also important for generating additional cash income it should be noted that not all jobs are

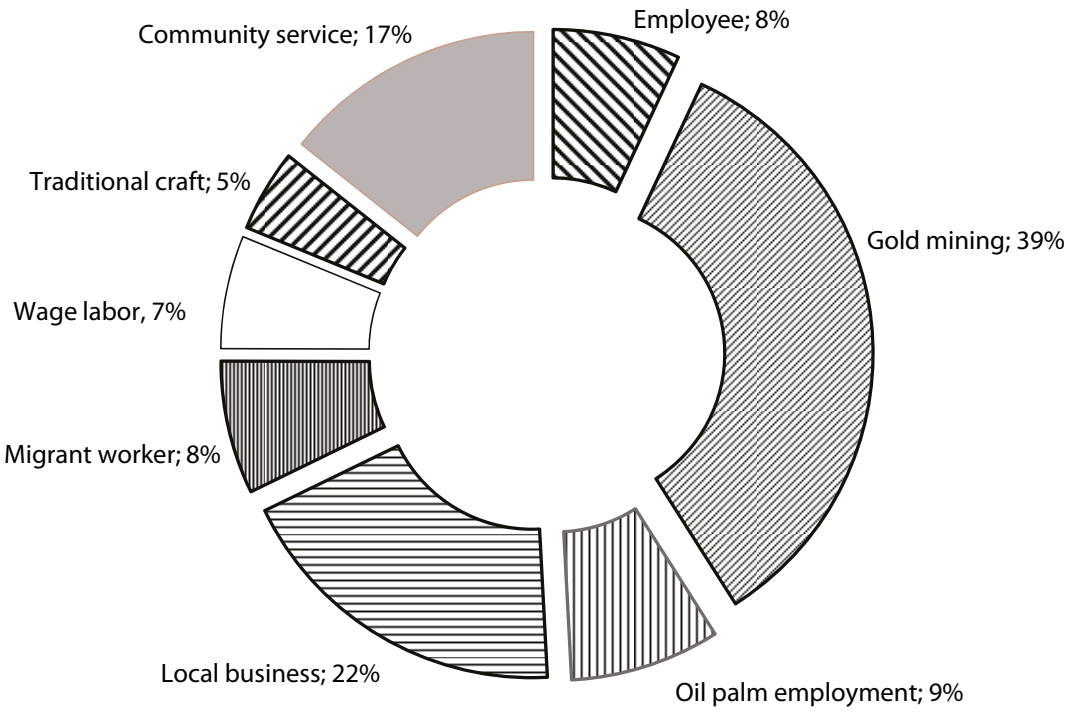

Figure 7. Distribution of other livelihood and non-farming income.

accessible for the whole community. Some require particular skills and educational background and may also require access to capital, for instance, to run a business. The lack of job opportunities is often echoed by the local community and many leave the village to work in Malaysia, especially in Pilot 1 and 4. The number of new labor opportunities, particularly on oil palm plantations, is growing in Kapuas Hulu.

5. Critical issues impacting the Kapuas Hulu District

"Critical issues" are defined here as factors driving change in the way that land and natural resources are used, and that these factors may result in negative impacts not only environmentally, but also economically and socially. Critical issues should be given careful consideration in any land-use planning process, ensuring that the potential socio-economic conditions and potential future impacts are duly considered. The critical issues facing Kapuas Hulu as identified from the CoLUPSIA socio-economic survey work are discussed below.

5.1 Increased land pressure caused by a growing population – managing tomorrow's resources?

Population growth is an underlying critical issue for Kapuas Hulu. In all land-use decision making it is necessary to consider the future impacts and requirements of a larger population. It is evident from the socio-economic survey that the majority of the population across all pilots relies on agriculture for subsistence purposes. A number of key questions therefore need to be asked when allocating land for

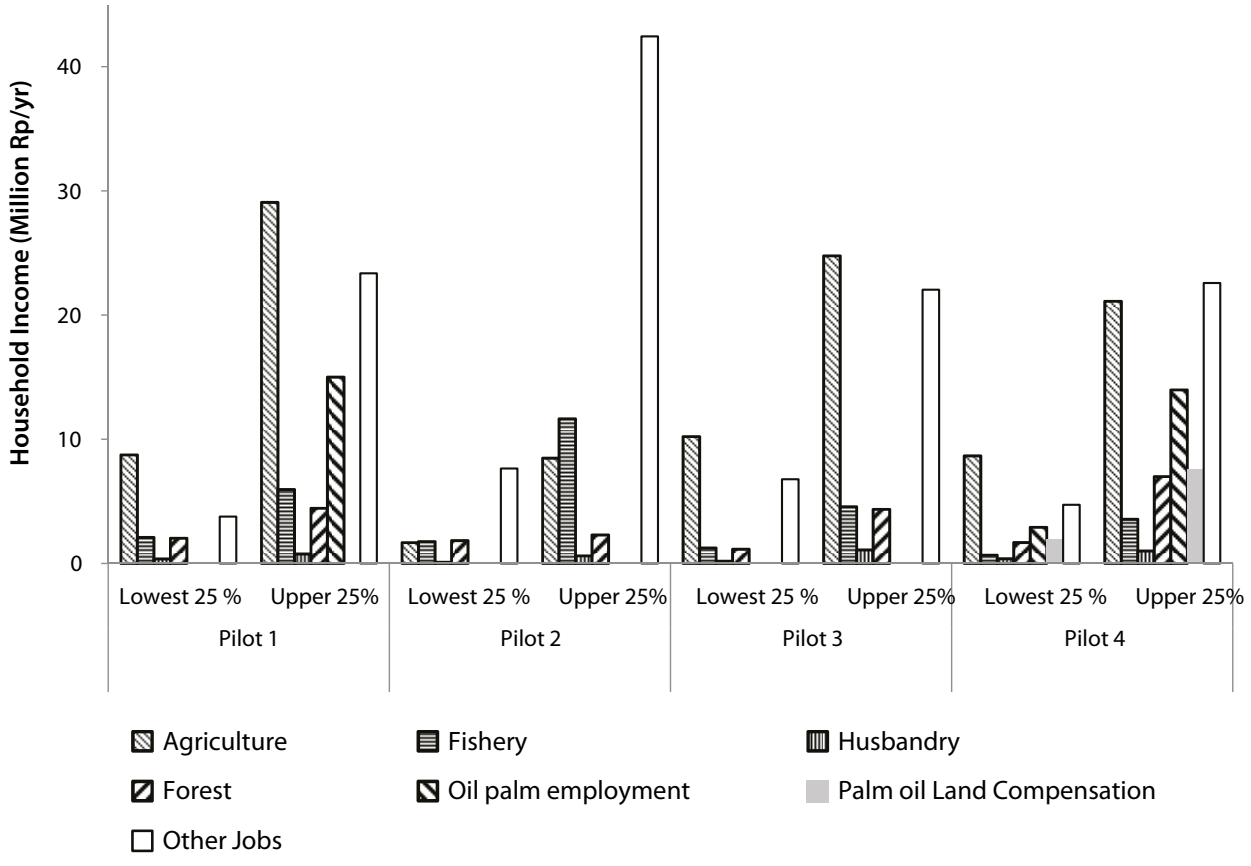

Figure 8. Income per year by top and bottom 25% of the pilot areas.

alternative uses. For example, if land is allocated to oil palm plantations on a 25-year lease, will there be enough agricultural land to support the village over this time or does oil palm contribute to open more employment to the people? It is important that socio-economic and environmental consequences of land-use decisions be analyzed in order for there to be a sustainable future.

5.2 Expanding oil palm plantations – economic growth or environmental degradation?

A major potential environmental risk to the district may be a consequence of rapid economic development. There is a need for development particularly in employment opportunities, education and health care. However, if this is not managed carefully, it could have irreversible consequences for all sectors of society and the environment. The pressure of oil palm plantations is dominant in the region and one that is bringing definite financial benefits to groups within Kapuas Hulu.

For example, Figure 8 indicates high levels of income from compensation and employment from oil palm plantations in Pilot 4 where it is playing the important role of enhancing household incomes. However, the results of the socio-economic survey indicate that there is also a need to analyze the distribution of these benefits. For example, in Pilot 4, the 15 households that obtained compensation from oil palm are in the top 25% by income, whilst only six households in the bottom 25% received compensation. There is a risk that developments such as oil palm plantations may create inequalities in wealth within the local communities and marginalize some of the poorest from resources, which would have otherwise been available.

Currently, not enough is known to understand the full impact on the ecosystem functions of the expansion of oil palm plantations. Further development should be based on more information and in full consultation with all stakeholders and users of the land.

5.3 Gold mining – dependence on a damaging and dangerous activity?

Gold mining is a prevalent source of cash income across the Kapuas Hulu District and is the leading source of income in 2 of the 4 pilot areas and second most important income in terms of value in Pilot 3 (see Figure 5). Figures 5 and 8 identify the extent to which gold mining has become integral to income across all levels of the community. Pilot 2 exhibits relatively lower levels of financial poverty with the majority of those surveyed being in the top tier of income per household (see Figure 3) with gold mining generating the majority of this wealth. It could be assumed here that gold mining has provided the impetus for economic development and social mobility, for instance, 10% of household income is spent on education in the Pilot 2 village of Beringin Jaya (see Annex 4).

Despite the clear benefits there are numerous potential adverse impacts on the environment and human health, where the techniques involved can degrade watercourses and pollute rivers. It is interesting to note that the pilot areas with the highest levels of mining are also those where the most household income from fishing is generated (Figure 5). The miners are often working without official permits and in conditions, which do not give them legal protection and they are then often vulnerable to extortion.

There is a risk that a growing over-reliance on gold mining will have the consequence of severely (and irrevocably) impacting other activities, which are important for both income and subsistence. Gold mining has become a dominant livelihood and whilst the income generated can have obvious benefits there is a need to become less reliant on an unsustainable and often dangerous activity. Solutions could be sought in developing safer and legal mining techniques, while improving the protection for people and the environment.

5.4 Other critical issues

Road construction

With economic development often comes improved transportation and in the case of Kapuas Hulu this is evident in the improvement of the road from Putussibau to Badau. While this opens up access to markets for local communities, allowing the sale of agricultural commodities, it also poses a threat to the local natural resources, providing more opportunity for land clearance and development if not adequately managed. The balance between natural resources and economic development, within a "conservation district" commitment, is clearly a challenge.

Marginalization of access to forest and land resources

With a growing population, economic development and a shift away from subsistence agricultural production to commodities, such as oil palm, there are increasing pressures on land both in terms of its availability and access. However, subsistence farming and the use of NTFPs, is still significant for most households across Kapuas Hulu. There have been incidences of conflict and social disruption, historically, between villages and logging concessions. Today there are similar experiences with oil palm in some places. However, in other areas, oil palm plantations are welcomed as an opportunity for economic development primarily through employment. Where oil palm plantations are developed communities need to ensure that all households have access to the potential development and that no particular community or household is marginalized in its access to land. In addition, unclear boundaries for the two national parks creates confusion and in some cases conflict over access to the forest resources. Where conflict has arisen, for example in Pilot 1 when villagers sought to harvest timber for their longhouse, it has in most cases been amicably resolved. Cultural values and use of the forest resources appear to be accepted by all those involved.

6. Concluding points

It is important to understand the relationship between socio-economic activities and the geo-physical "mechanism" of the district. This is especially relevant in Kapuas Hulu with the Danau Sentarum National Park, surrounding peat lands, and the mountainous regions to the north, west and southwest, including the Betung Kerihun National Park. Kapuas Hulu is renowned for its unique natural resources and ecosystem services with far reaching impacts not only on West Kalimantan, but are also of national and international importance.

This report explores the social and economic dynamics of Kapuas Hulu in relation to the use and dependency of natural resources. It highlights the key socio-economic factors, drawing on the information gathered from the socio-economic surveys at the pilot level. The four pilot areas present varying biophysical traits that are reflected in the socio-economic activities. Across all four pilot areas communities are faced with the land-use challenges of balancing the needs of the provision of subsistence food and resources, with economic development through income-generating activities, such as the production of rubber and mining activities.

Although there are signs of a move away from subsistence agriculture to paid employment, there remains a high dependency on natural resources for both income and subsistence, in the district. Paid employment, traditionally rubber, timber and NTFPs, and increasingly oil palm, are all from natural resources. In order to ensure sustainable economic growth, sustainable use of the natural resources coupled with an understanding of the interdependencies, e.g., oil palm and water flow in Danau Sentarum and the Kapuas River, is essential.

A number of critical issues have been identified including: expanding population and pressure on land; development of oil palm plantations; and an economic dependency on the unsustainable and environmentally damaging practice of gold mining. These critical issues represent factors that are driving change in the way that the land and natural resources are used, with the risk of potential environmental and social negative impacts, in order to gain economic development. Critical issues should be given careful consideration in any land-use planning process, ensuring that the potential socio-economic conditions and potential future impacts are duly considered.

Where critical issues exist, there is a potential for a payment for ecosystem service (PES), in some exceptional circumstances, to be established. If correctly established, with the appropriate benefit sharing mechanisms, PES may provide an additional source of revenue for the population of Kapuas Hulu, ensuring that the true economic value of the resources is recognized and financially realized. PES can be established where an issue, such as to improve water quality, is recognized by a buyer (water company) and can be rectified by upstream stakeholders, such as gold miners. The need for change, recognition of the issue and willingness to pay for change, within a defined boundary, are all conditions for the establishment of a PES. On a larger scale, there is the potential for Kapuas Hulu District to be compensated for the ecosystem services that it provides to neighboring districts, the province of West Kalimantan and even nationally, through a PES framework, however, this requires further research. The potential to establish PES will continue to be explored during the work of CoLUPSIA.

Annex 1. Socio-economic study of villages in the Pilot 1 area: torn between development and conservation

1. Background information to Pilot 1

Pilot 1 is located in the northern part of Kapuas Hulu district. The socio-economic survey was conducted in seven randomly selected villages: Sungai Abau, Mensiau, Pulau Manak, Belatung, Nanga Embaloh, Tanjung Beruang and Benua Tengah. The area is ecologically and biologically significant, forming a corridor rich in biodiversity between two national parks (Betung Karihun National Park in the north and Danau Sentarum National Park in the south). The region is also socially and economically important where there is a longstanding cultural connection between the villagers and the landscape as a source of livelihoods. Local inhabitants comprise mostly Dayak tribes such as Iban (Sungai Abau, Mensiau), Tamambaloh (Pulau Manak, Benua Tengah) and Kantuk (Belatung, Tanjung Beruang) sub-ethnic groups, and a Malay ethnic group live in Nanga Embaloh village.

The villages of Sungai Abau and Mensiau are part of Batang Lupar sub-district and have good market access to the nearby sub-district capital, Lanjak, as well as to Badau. Although close to the sub-district capital, access to the particular hamlets is still limited. In both villages, hamlets are spread out and have variable road accessibility.

In Sungai Abau, the hamlets of Sungai Sedik and Sawah have better road access, whereas Sungai Luar, Sungai Long and Sungai Iring have not. Both Sungai Long and Sungai Iring are difficult to access and inhabited by only a few households (<15 HH). In Mensiau village, the hamlets are close together and accessed by road. The road is relatively accessible, but occasionally, when the bridge is broken, the road is impassable.

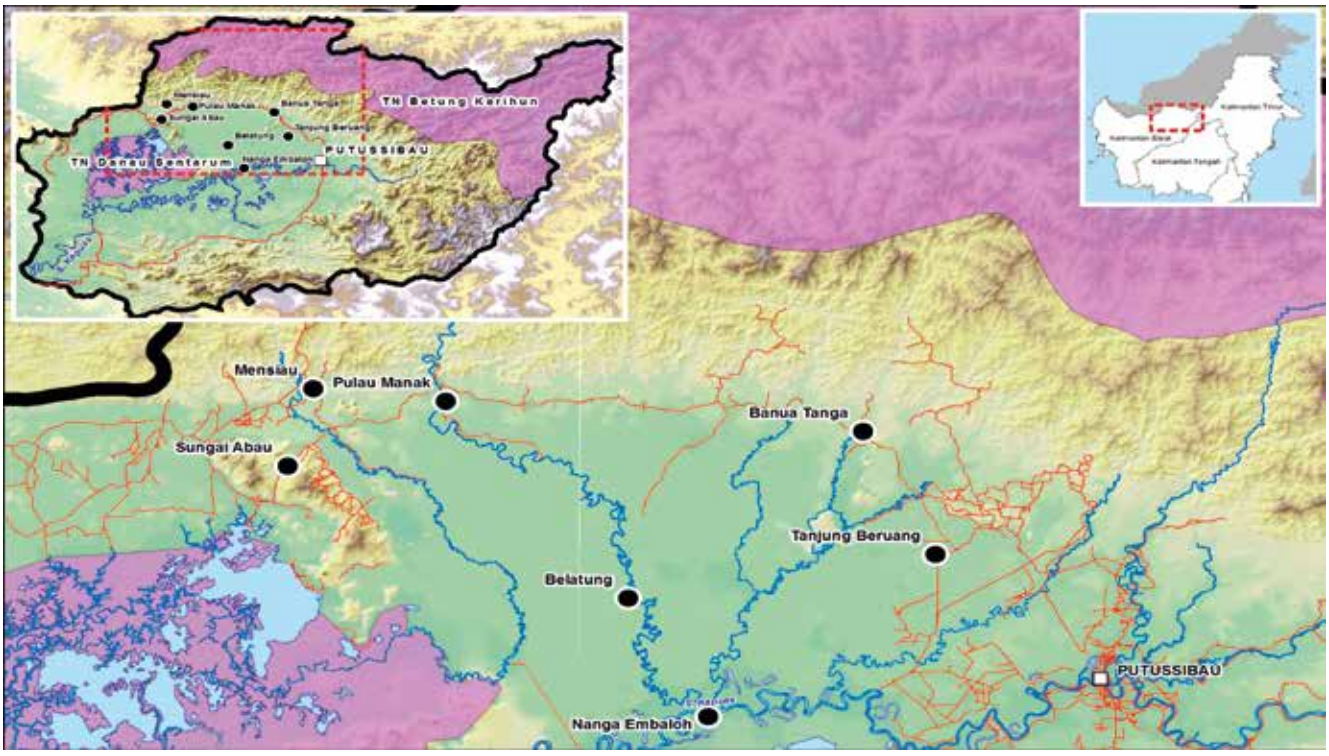

Figure 1. Map of Pilot 1.

Table 1. Key facts for Pilot 1.

Villages	Sungai Abau	Mensiau	Pulau Manak	Belatung	Nanga Embaloh	Tanjung Beruang	Benua Tengah
Sub-district / Kecamatan	Batang Lupar	Batang Lupar	Embaloh Hulu	Embaloh Hilir	Embaloh Hilir	Putussibau Utara	Putussibau Utara
Hamlet	Sungai Iring, Sungai Long, Sungai Luar, Sungai Sedik, Sawah	Keluin, Kelawik, Entebuluh	Balimbis, Pinjawan, Talas	Belatung, Sangkuang Kuning, Pala pintas	Jaya Laksana, Bayan	Tanjung beruang, Jangkang	Lauk, Benua Tengah
Population[1]	405 (111)	504 (204)	571 (164)	550 (162)	1125 (341)	528 (180)	899 (192)
Number of sampled HH	40	35	40	40	40	40	40
Major ethnicities	Dayak Iban	Dayak Iban	Dayak Tamambaloh	Dayak Kantuk	Malay mixed Chinese	Dayak Kantu	Dayak Tamambaloh
Number of HH involved:[2]							
a. Dryland agriculture	37(7)	34(4)	35(9)	39(1)	5(1)	38	40
b. Rubber gardens	(35)	(32)	(27)	(35)	(25)	(39)	(40)
c. Livestock	34(8)	25 (20)	37(19)	36(12)	14(2)	30(2)	35(9)
d. Fish ponds	10	-	14	-	5	1	4
e. River fishing	6(4)	9	17(12)	30(8)	29(23)	28(5)	37
f. NTFP extraction	32(1)	21(1)	24(4)	37(21)	21(16)	29(17)	35(21)
g. Timber extraction	6	3	7(5)	15(3)	13(9)	8(6)	8(5)
h. Other livelihoods	(10)	(23)	(24)	(17)	(21)	(15)	(15)
Education facilities	Elementary school	Elementary school	Elementary school	Elementary School	Elementary school, Junior high school	Elementary school	Elementary school, Junior high school
Health facilities	Village clinic	Village clinic	Village clinic	Village clinic	Village clinic	Village clinic	Village clinic
Village development Program/Project	National Program for People Empowerment (PNPM–Program Nasional Pemberdayaan Masyarakat) (infrastructure: road, water, sanitation), WWF	PNPM (infrastructure: road, sanitation)	PNPM (infrastructure), WWF – National park	Road infrastructure	Road infrastructure	PNPM, health agency, village allocation fund	Road infrastructure

Note: Figures in brackets represent:
1 Number of Households (HH)
2 Number of HH generating income

Pulau Manak and Belatung are located on the Embaloh River, but have varying transportation access. Pulau Manak has good road access, but Belatung can only be accessed by river. Belatung upgraded from hamlet to village in 2009. The people of Belatung were given training by the Industrial and Trade Agency (*Dinas Perindustrian dan Perdagangan*) in rattan mat making several years ago and they still produce rattan mats although the amount of raw materials are declining and market access is still limited. Nanga Embaloh, the capital of Embaloh Hilir sub-district, is located on the confluence of Embaloh River and Kapuas River. The population in Nanga Embaloh is 1,125 inhabitants, quite large compared to other villages and is the only sub-district capital with no road access.

Benua Tengah is approximately 2 hours drive from Putussibau, which has good road and market access. Benua Tengah and Tanjung Beruang are close together. Tanjung Beruang is the closest, among all surveyed villages, to Putussibau and also close to the oil palm nursery of First Borneo Plantation group.

In general, the people in Pilot 1 live in longhouses, which consist of a number of families living in juxtaposed "compartments". In Dayak these compartments are called *bilik*. Each compartment represents one household, which may consist of one or more families. Originally organized in that way to better protect the village, this living arrangement in the long house has the advantage of having shelter altogether with a sense of togetherness and social relations[5].

A modern lifestyle has introduced the concept of detached houses and as a result some of the community now live in detached houses. In Benua Tengah, the villagers live in both detached houses and in the longhouse, which according to the community is the oldest among all the longhouses in Kapuas Hulu district. The district government has also designated this longhouse as one of the district's heritage objects.

However, living in the longhouse is also prone to risks such as fire, especially during the long dry season. The longhouses in Sawah hamlet (Sungai Abau village) and Balimbis hamlet (Pulau Manak village) were burnt down in 2010.

5 http://www.indonesia.travel/en/destination/602

Administrative arrangements have been conducted by the local government and as a result several villages have expanded with a few hamlets being upgraded to village status. For instance, Lauk hamlet in Benua Tengah (in 2011) was promoted to village status and new hamlets were established in Benua Tengah namely Benua Tengah Hilir and Benua Tengah Hulu. As well as Tanjung Beruang, Jangkang was upgraded to village and Tanjung Beruang introduced a new hamlet, Sagin.

2. Results

2.1 Population and Education

The village populations in the Pilot 1catchment varied. Sungai Abau was the least populated village (405 inhabitants)and Nanga Embaloh the most populated (1,125 inhabitants)(see Table 1). The sex composition for Pilot 1 indicates relative balance and is comparable to the rest of Indonesia.

Generally both male and female heads of households had low levels of education. Between 40–80% had only graduated from elementary school (Figures 2 and 3). Between 5–30% had achieved higher levels of education up to senior high school, but less than 10% had a university degree. The survey results suggest that with education comes opportunity; for example, females who graduated from university were able to obtain a higher level of employment such as becoming a civil servant or a teacher.

Access to basic education was an issue in some parts of the pilot area, exacerbated by the lack of infrastructure and means of transportation. Although education infrastructure often follows that of settlements there remains a widespread lack of teachers and supporting educational facilities. For example, In Sungai Luar hamlet (Sungai Abau village) the school is only a first to third grade elementary school. Pupils must continue the fourth to sixth grades in another village or hamlet. In addition, a shortage of teachers working in the hamlet has resulted in pupils having to make a 10 km round trip walk to school. In the hamlets of Sungai Abau, namely Sungai Iring, there is no education infrastructure at all and pupils must go to the nearest hamlet. This means that they have to stay with relatives during the school term.

2.2 Land Use

As a basic means of production, land is important for agrarian communities. In Pilot 1, land is mainly used for swidden agriculture on dryland (*umai*, *ladang*),

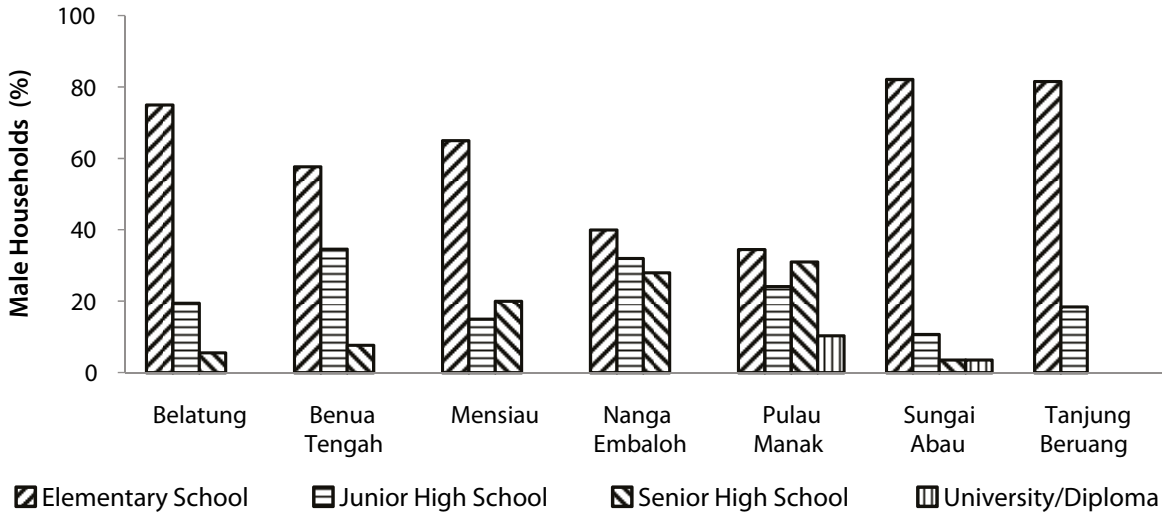

Figure 2. Education level of male heads of households.

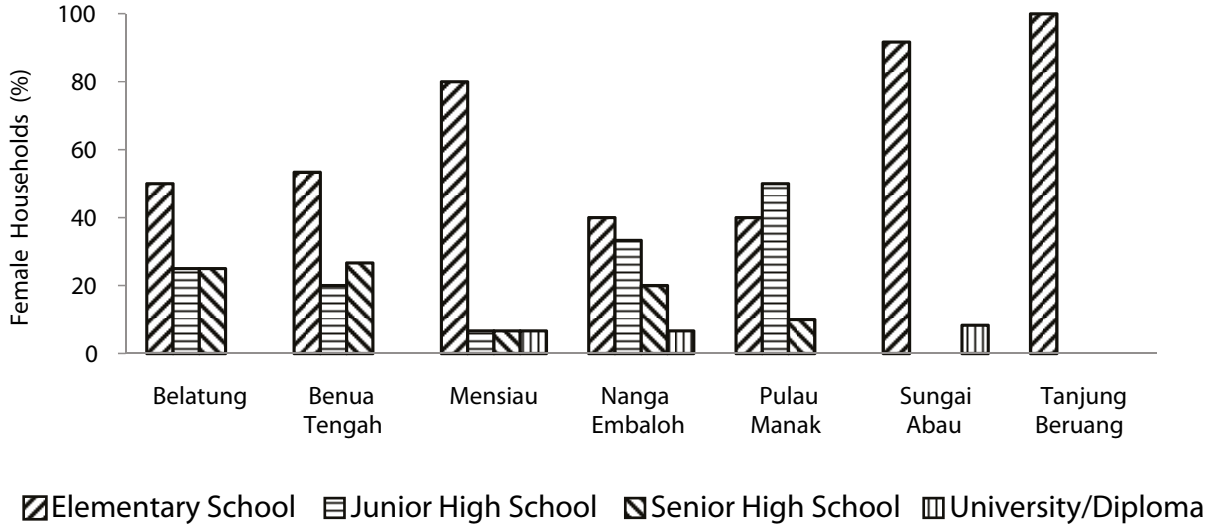

Figure 3. Education level of female heads ofhouseholds.

permanent paddy (*umai paya*, *sawah)* and the garden cultivation of perennial crops such as rubber, pepper, fruits and *tengkawang* nuts (Figure 4).

Swidden agriculture is common where the farmers often use the plot for 1–2 years then move to other plots for the same period, returning to the initial plot after 5 years or more. On dryland, villagers produce staple foods, i.e., rice and maize for subsistence. Besides rice they also grow vegetables, such as spinach, squash, eggplant, chili, *pok choy* and tubers. When the villagers produce more than they can consume, they are able to sell the produce in the nearest market, although this is a rare occurrence.

On average, dryland cultivation across all villages in this pilot area is more than 0.5 hectares (ha) per household. However, in Nanga Embaloh, prolonged flooding during May to September 2010 reduced the ability of households to undertake dryland cultivation. Similar flood events also took place in Belatung where the dryland use is about 0.5 ha/household. Residents of Nanga Embaloh and Belatung use open dryland on the riverbanks, as it is more accessible. Another type of land use is rice field (paddy – *sawah*) where people only growpaddy. If the land is available,they typically farm both types of land. In Sungai Abau and Belatung, paddy cultivation is about 0.6 ha and 0.7 ha, respectively,

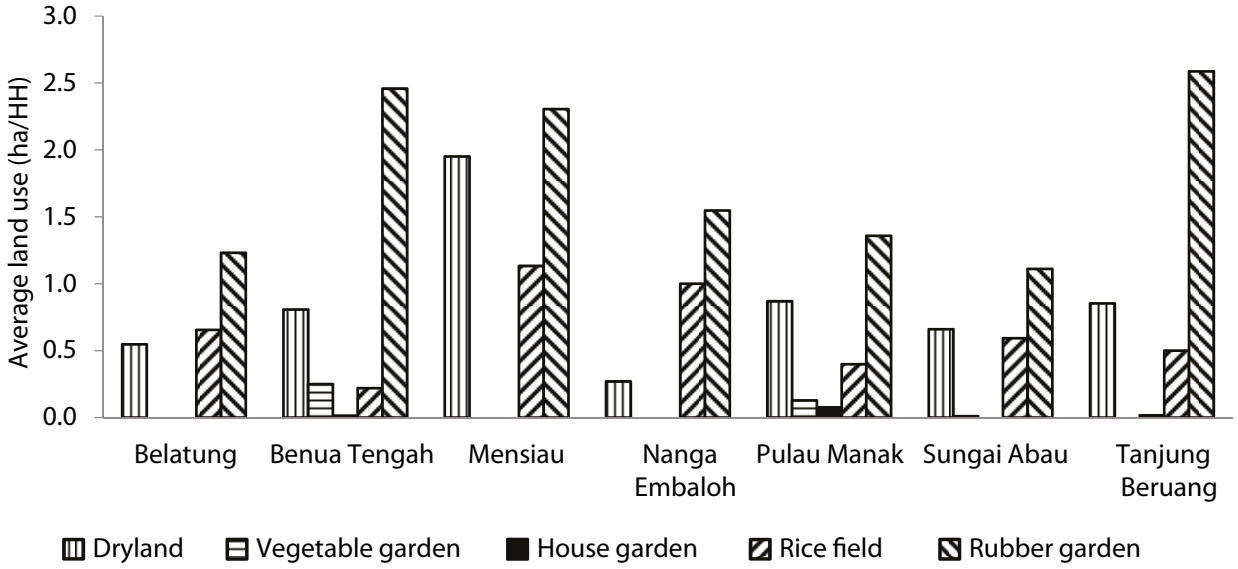

Figure 4. Land use in Pilot 1.

per HH, while in Pulau Manak and Benua Tengah the area used for paddy is far less about 0.4 ha and 0.2 ha, respectively, per HH.

Rubber is an important crop in this area. Rubber gardens provide a steady source of income as farmers tap rubber daily. Rubber gardens are commonly mixed with other perennial crops such as mango, rambutan, durian and *tengkawang* (S*horea* spp.). In the Pilot 1 area rubber gardens on average are between 1–2.5 ha per HH.

In general, land access in Pilot 1 is determined by several factors. Land is managed by customary law, but the rights to the land can also be held privately. The local communities' ancestors would have initially cleared the land for dryland cultivation. The main feature of such user rights is that the land can be inherited as well as lent to other members of the community. However, the land is rarely sold and is regulated by customary law.

In contrast, communal land, i.e., land that every member of the community can access and use, can have various functions such as old village sites (*tembawai*), tree reserves (*pulau*) and cemeteries (*pendam*) (Wadley *et al.*, 1997). Certain activities such as agriculture and tree cutting are prohibited, but members of the community are allowed to harvest the fruits.

Rubber gardens are relatively permanent in terms of land use and rights with long-term benefits from harvesting the rubber. The use of land for rubber gardens has, in some cases, resulted in issues of land availability. Land used for permanent rubber gardens is not available for agricultural purposes, which is required to meet the demands of a growing population.

Land at a greater distance from the village center may be available, however, it could prove too costly in terms of time, access and transportation to make it an attractive alternative for agricultural land. The villagers are able to borrow land for agriculture, but the land cannot be planted with permanent crops such as rubber or other perennial crops. For instance, in Sungai Abau and Mensiau, it has been a practice for people to borrow land from their fellow villagers as an alternative way to have access to land that is closer to the village (see Figure 5).

There are no direct financial consequences of borrowing land. The right holders usually do not ask for any rental fees, however, the borrower may be requested to provide labor for the right holder, for example for clearing the land, to assist with harvesting, etc. Alternatively, sometimes the borrower may make a payment in kind through the exchange of fertilizers or other chemicals. It depends on the willingness of the owner and the ability of the borrower. In fact, borrowing land may indicate an issue of land insecurity, as people are not able to rely on the land for future use and the lack of land available for swidden cultivation may reduce the capability of people to fulfil food security needs.

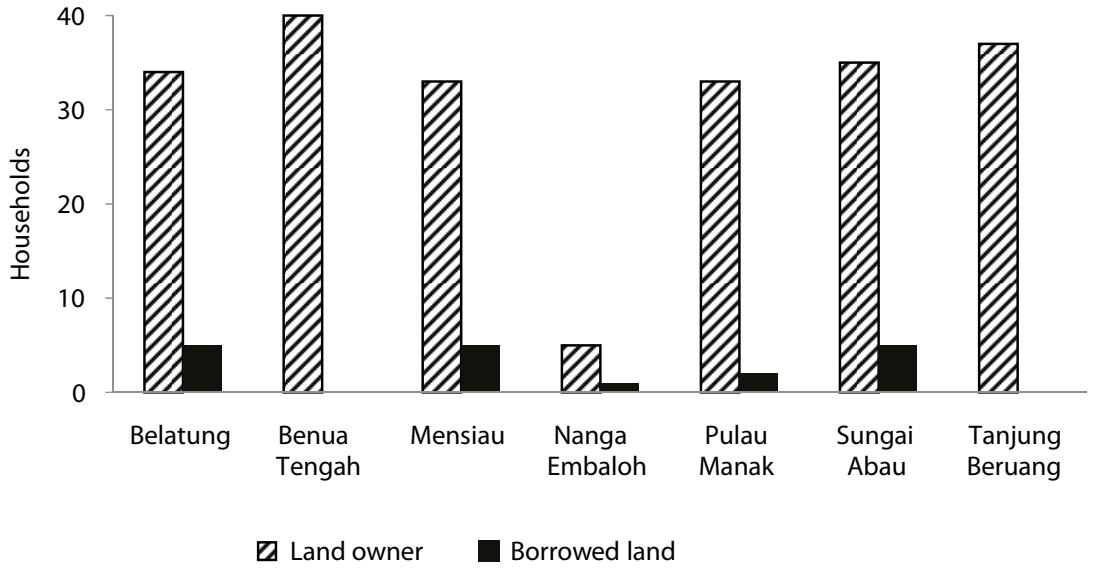

Figure 5. Number of HH that have access to land.

2.3 Livelihoods and economic analysis

Villagers undertake multiple activities for subsistence and in order to earn income. Rice farming activities are mainly for subsistence. Although selling agricultural produce is unusual, it does occur in Sungai Abau, Pulau Manak and Belatung and they also sell agricultural produce in nearby markets. Income earned though is relatively small when compared to other activities.

Rubber tapping is widespread and generates quick and significant cash income. Farmers tap the rubber daily especially in the dry season. Rubber is tapped less frequently during the rainy season, as there is a risk that the rainwater may mix with the latex, lowering its quality.

Each week, farmers collect a minimum of 5 kg of dry latex. The price of dry latex varies across villages, depending on the access to market, ranging from Rp10,000 to Rp12,000 per kg[6]. Starting at the end of 2010, the dry latex price increased considerably compared to the historic average price. Income generated from rubber tapping activities ranges from Rp6 million to Rp8 million per HH per year.In general farmers tap the rubber around 180–200 days a year leaving the rest of the year for practicing dryland agriculture. Depending on the rubber area harvested, farmers can obtain up to 15 kg/day. A minimum of 5 kg per week is extracted with an income of around Rp50-60,000 (5 kg × Rp10,000/kg), thus the annual income from rubber/dry latex is in the region of Rp2.6 million to 3.12 million.

Rubber is by far the main source of income for villages in this pilot area. However, fishing is also important for livelihoods such as in Nanga Embaloh, which ison the Kapuas River. While in other villages, fishing is mainly for subsistence. The next most important sources of income, for all households, include earnings from abroad (Mensiau), wage labor and local business (Nanga Embaloh, Pulau Manak).

Fish resources are mostly for subsistence and not for sale. Fish harvests are only sold when the market opportunity is available. Fishermen use traditional fishing gear such as fishing rods and nets, and for commercial fishing they use specialist equipment and increase the number of fishing traps. In addition, they also breed fish in ponds. Normally, pond fisheries are for subsistence, but in Pulau Manak there is one respondent who grows fish for his small restaurant.

The fish catch is usually salted, smoked, or used or sold fresh. Fish products are mostly fish crackers and steamed fishcakes (*krupuk basah*[7]). Steamed fish cakes from Nanga Embaloh are usually sold in the local market as well as Putussibau market. Since

6 All prices are from the period 2009 - 2010

7 A typical Kapuas Hulu' snack made from mixed flour and fish and served with peanut sauce

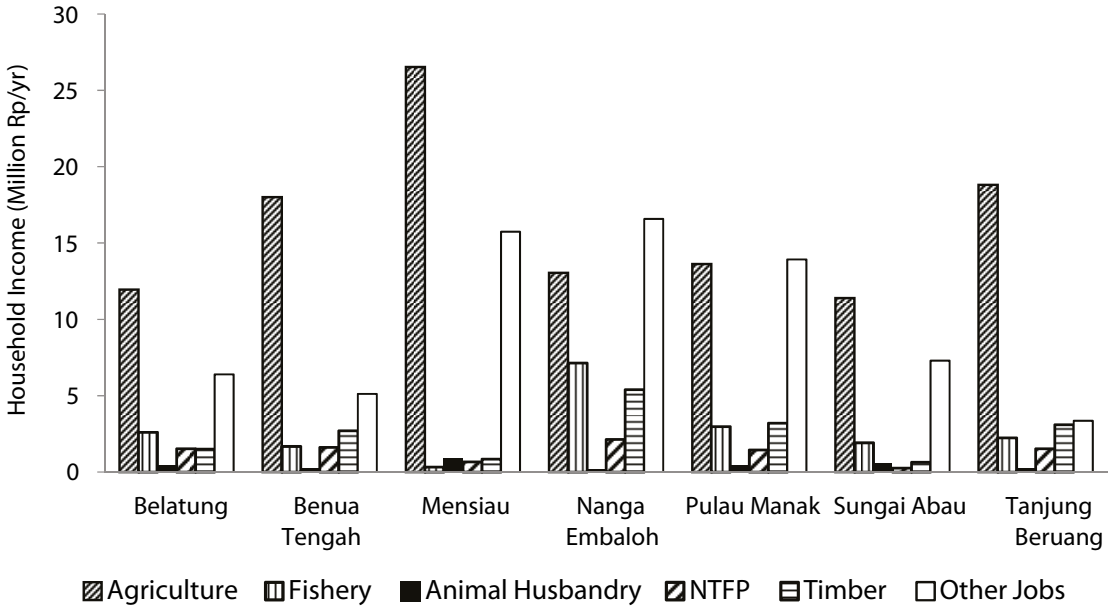

Figure 6. Household income distribution by activities.

Nanga Embaloh is located on the Kapuas River, fish and fish products are readily transported to various markets.The highest annual cash income generated from fishing activities is in Nanga Embaloh at about Rp7.7 million per HH. In other villages the average income generated from fishing is far lower. Only fresh fish is sold in local markets.

NTFPs are important for subsistence and financial benefits. The villagers collect numerous products such as game, medicinal plants and various food plants. They also collect raw materials for traditional handcrafts, building, house wares, etc.

Rattan is essential for villagers in the Pilot 1 area. Most collect rattan for subsistence. However, in Belatung they have been making traditional rattan mats (*lampit*) since the 1990s. One elder (now a customary head) introduced techniques for improving rattan utilization and making rattan mats, to the community. At the time, they built a workshop for mat production and received assistance and training from the district and provincial industrial agencies. Up until now the industrial agency of Kapuas Hulu is still involved in facilitating training on various themes related to rattan product designs[8].

In the past the *lampit* were sold to local markets and then exported on to Sarawak, Malaysia. Currently, *lampit* production is constrained by a lack of access to other markets due to insufficient transportation as well as design and production issues. In terms of raw materials, the best quality species (local: *segak*) have decreased, especially in the Belatung area. Craftsmen often buy these species from nearby villages. To resolve these issues there is an initiative from local people to replant rattan near the village in order to ensure sustainability of *lampit* production. The villagers still produce *lampit* and sell them to the local markets.

Tengkawang nuts (*Shorea* spp.) are also important for rural Kapuas Hulu. They are a valuable species used by pharmaceutical and cosmetic industries. The villagers harvest them once every 3 years and collect around 200–500 kg/HH, which is then sold in local markets at a price of around Rp 8,000/kg.

Honey is also another important NTFP in the Kapuas Hulu area. Traditionally, villagers collects honey from tall trees (*Lalau*) and wooden frames placed in trees (*tikung*) in areas that correspond to bee habitat. Generally, honey collectors squeeze the nest along with its contents to remove the honey. The honey collector from Nanga Embaloh collect honey from the Lalau trees, where there are about 50 bee colonies. The trees are protected by customary law and the tenure for individual trees is specific, as the trees are inherited and only descendants can collect

8 Harian Equator, June 23, 2010 http://www.equator-news.com/radar-timur/kapuas-hulu/bina-perajin-disperindagkop-gelar-pelatihan

the honey. If the tree is abandoned for several years, it can be claimed by anyone who finds it. Then they take responsibility for weeding around and pruning the tree in order to attract honey bees to nest in it. In addition in other part of Kapuas Hulu, honey collectors of Danau Sentarum National Park formed an association called APDS (*Asosiasi Periau Danau Sentarum*) have been benefited from an improved technique to yield honey hygienically[9].

A lack of assistance and information are the main issues facing traditional honey collection. As a result the honey quality is relatively low and thus the price of honey in the local market is also low at about Rp35,000/kg, compared to organic honey produced by APDS members where the price is about Rp45,000/kg.

Other non-timber products used for subsistence, among others, are pandan, bemban, gernis, kulan and krupuk for baskets, mats etc. Women are the main actors who collect and process these products into traditional crafts. Baskets and woven mats are usually produced for personal use and rarely for sale.

Logging activities have declined since the logging ban several years ago. The community extracts timber mainly for domestic use (housing, furniture etc.) and if it is sold, it is sold in the local market. However,small logging groups were found during the survey in Pulau Manak, Belatung, Nanga Embaloh, Tanjung Beruang and Benua Tengah.

Small furniture workshops were found in Nanga Embaloh to meet local demand. The timber came from the local people who cut the timber in the areaof a former concession. There were two concessions near Embaloh and Kapuas River, PT. Benua Indah and PT. Lanjak Deras Jaya Raya; both are now inactive.

In addition to cash income, subsistence activities are also important. In Figure 6 we can see that agriculture, for both cash and subsistence, play an important role in the household income, followed by other income from non-farm activities.

Rural livelihoods are dependent on multiple activities. Villagers who tap rubber also catch fish and rear livestock. Income is also generated from alternative, non-farming activities, such as working as a local merchant, using artisan skills, wage laborer, civil servant, etc. Development projectslike PNPM also provide job opportunities for villagers, such as daily workers.

It is still common practice for members of the Iban communities to migrate to Sarawak, Malaysia and Brunai in order to find employment[10]. In Sungai Abau, while the survey was being conducted, many of the males of productive age left the village for work in Sarawak, leaving women, children and elders to maintain the paddy fields. They usually leave for Sarawak after the seeding season in September/ October and return around May/June when the Iban community celebrates the harvest day known as *gawai*.

Income generated from non-farm activities occurs more frequently in Pulau Manak and Nanga Embaloh than in other villages. These villages have a wider diversity of income, due mainly to Nanga Embaloh serving as a sub-district capital as well as a stopover port, whilst Pulau Manak is a rest area for land transportation in northern Kapuas Hulu.

2.4 Household assets

Household assets are important for rural communities. There are several assets, which are important and also support livelihood activities, such as chainsaws and rifles. Chainsaw possession across villages is relatively similar at around 40% to 70% of the households. Chainsaws are mainly used for cutting trees (timber, rubber, etc.) and are very helpful during land clearing. Rifles are used for hunting, which is still practiced, although nowadays people need to go further into the forest to hunt for wild boar, deer, mouse deer, pangolin, etc. In Nanga Embaloh, however, riffle possession is very low because their livelihoods are centered on fishing in the river.

Motorcycles and boats play an important function for transportation for work, for example, to carry the harvest from the field to the village and goods from village to market and for personal use. The main transportation in Nanga Embaloh, Belatung and Tanjung Beruang, is water transportation; therefore boat possession is quite high. Pulau Manak is accessible both by road and river, but motorcycle

9 http://www.maduhutan.com/informasi/lebah-hutan, last accessed on 1 October 2011

10 Wadley, R., Colfer, C. and I Hood (1997), Hunting Primates and Managing Forests: The Case of Iban Forest Farmers in Indonesian Borneo, Human Ecology Vol 25 (2), pp.243 – 271

possession is higher than boat. This is also the case in Mensiau and Sungai Abau (Table 2).

Other assets include savings and investments predominately in the form of gold jewelry and ancient jars (Figure 7). Gold is relatively resistant to inflation. The villagers buy gold as an investment, which is sold in times of need. Ancient jars are often a valuable asset for rural communities in Pilot 1. The jars are inherited, the value of which is immeasurable. Traditionally, the jar is used for storing rice and as an exchange for customary ceremonies. Jars are commonplace in Dayak communities, however, they are absent in Malay communities.

3. Critical issues

3.1 Logging: preferred for quick cash

During the surveys, stories of massive logging activities in the past were often told. From a purely economic perspective, it was seen to benefit the local economy in the short-term. Villagers earned quick cash through job opportunities at the local level, however, these logging activities also attracted labor from nearby villages, sub-districts and even from outside Kalimantan. At the village level benefits were in the form of contributionsto village development. For example, one timber tycoon renovated the long house in Sungai Luar hamlet. However, from an ecological point of view, the timber resources decreased, especially near the riverbanks, and as a consequence today people have to walk further to find timber to cut.

Many people feel constrained by the logging ban, as there is a lack of alternative job opportunities and thus an inability to generate quick income. With such a constraint the local communities manage by maintaining rubber gardens and gain additional income from other work, locally or internationally, e.g., by migrating to Sarawak.

Table 2. Asset distribution across villages in the pilot area.

Asset / Village	Chainsaw		Motorcycle		Boat		Rifle		Ancient jar	
	N	%	N	%	N	%	N	%	N	%
Belatung	17	43	2	5	36	90	8	20	9	23
Benua tengah	18	45	10	25	10	25	14	35	10	25
Mensiau	29	73	19	48	12	30	30	75	23	58
Nanga embaloh	17	43	5	13	35	88	1	3	-	0
Pulau manak	15	38	25	63	23	58	15	38	16	40
Sungai abau	16	40	12	30	6	15	22	55	31	78
Tanjung beruang	15	38	8	20	28	70	9	23	5	13

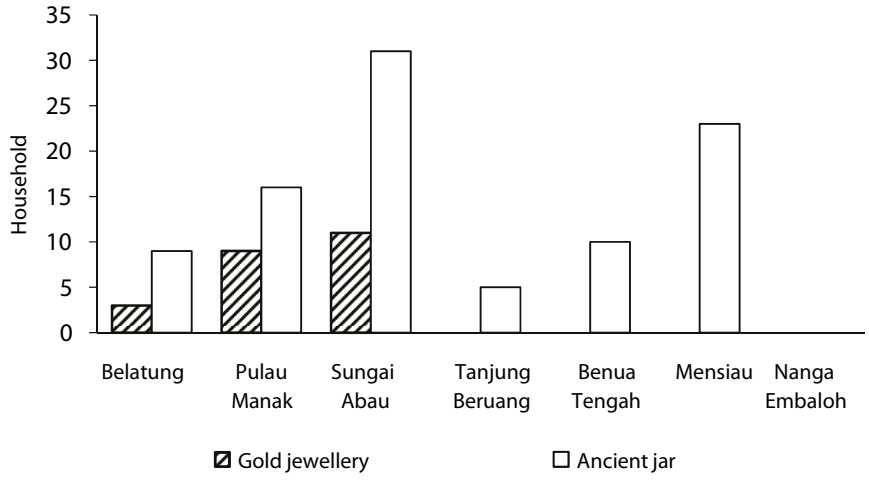

Figure 7. Gold and ancient jar savings and investment assets.

3.2 Trade-off between conservation and development

As Pilot 1 is located between two NPs, the expansion of land for agriculture is somewhat limited, as is the ability to access the forest for timber and other economic resources. This could potentially create conflict among communities and the national parks. A recent case indicated that the source of conflict between community of Pulau Manak village and Betung Kerihun NP (BKNP) was a lack of clarity of land ownership and access rights. In 2011 Pulau Manak community intended sourcing the Borneo ironwood (*Belian; Eusideroxylon zwageri*) from the forest to rebuild their long house which was burnt down in 2010. According to the community, the trees to be harvested were located on customary land, but the park management insisted that it was inside the park and therefore they forbade the community to harvest the trees. As a result the local people were angry and sealed one of the national park offices in the area by customary law[11]. However, the park management eventually resolved the issue by allowing the local community to cut timber for the sole purpose of building a new long house in Pulau Manak.

3.3 Oil palm development: community resistance

Oil palm development does exist in some areas of Kapuas Hulu such as in Badau and Nanga Silat. Although in Pilot 1 there are, as of yet, no oil palm plantations, a few nurseries have already been established near Tanjung Beruang village and Lanjak (Batang Lupar sub-district capital). Currently, there is a degree of resistance to the oil palm industry, for instance in the Dayak communities (Iban and Tamambaloh) in Embaloh Hulu sub-district where villagers have refused any oil palm development, anyone who cooperates with an oil palm company will face their customary leader who will revoke their customary rights[12]. Despite resistance, oil palm projects seem set to continue in the future as indicated by nursery development and ongoing land clearing. Recent development has shown that a company has just started a plantation near Senunuk village, Batang Lupar sub-district[13]. Keluin hamlet (Mensiau village)reported that there had been a disagreement concerning the marking of the land for oil palm, conducted by the land authority and plantation representative.

3.4 Ecosystem goods: The potential for NTFP development

Meijaard *et. al*. (2011) suggests differentiation between ecosystem services and goods in order to apply incentives for management use or conservation such as certification[14]. In the Kapuas Hulu context ecosystem goods and services are interrelated and in the case of NTFPs sustainability greatly depends on how people manage the forest. Forest honey from Danau Sentarum is one example in which ecosystem services can be bundled with NTFP certification (p.24). Other NTFPs such as rattan have economic, as well as conservation, values as in Belatung village where villagers produce *lampit* mats and also attempt to sustain their raw materials by planting rattan near the village. Further development of NTFPs in terms of production techniques and marketing would provide an incentive for local communities to manage and harvest NTFPs sustainably.

11 Office BKNP is still sealed, four Tumenggungs discuss MoU, May 24 2011, http://www.kalimantan-news.com/berita.php?idb=6814 accessed 1 October 2011

12 Indigenous community refused oil palm, Kompas Newspaper, September 12, 2011

13 First Borneo plantation opened oil palm plantation in Senunuk village, http://www.borneotribune.com/kapuas-hulu/fpb-buka-lahan-sawit-di-desa-senunuk.html, Borneo Tribune March 19, 2011

14 Meijaard, E., Sheil, D., Guariguata, M.R., Nasi, R., Sunderland, T. and Putzel, L. 2011 Ecosystem services certification: opportunities and constraints. Occasional Paper 66. CIFOR, Bogor, Indonesia

Annex 2. Socio-economic studyof villages in the Pilot 2 area: to what extent can people who live in remote areas benefit from development?

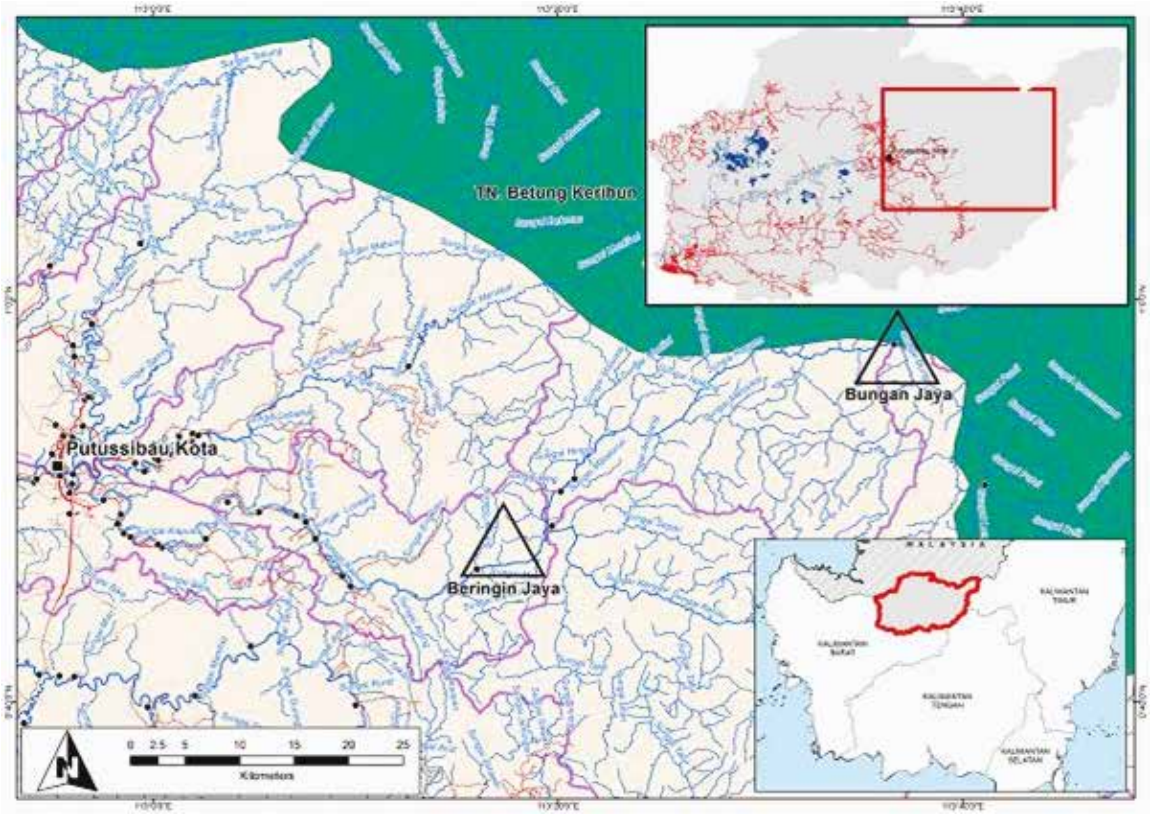

Figure 1. Map of Pilot 2 area.

1. Background information to Pilot 2

The Pilot 2 area is geographically located in part of the upper Kapuas Basin, as shown in Figure 1. It comprises three sub-catchment areas, the Sibau, Mendalam and Kapuas Kohen, with the main rivers Sibau, Mendalam and Kapuas, respectively. These rivers meet in Putussibau, the capital of the district, and flow into the Kapuas River and down to Pontianak, the capital of West Kalimantan province.

Betung Kerihun National Park (BKNP) also lies in the upper Kapuas Basin with an area of 800,000 ha it has a variety of different ecosystems, including lowland forests, alluvial forests, swamp forests, old secondary forests, hill forests, submontane and montane forests[15].

Bungan Jaya and Beringin Jaya villages are located on the banks of the Kapuas River in the Kapuas Kohen catchment. Both of these villages are of interest as they have close interactions with BKNP. Bungan Jaya shares a boundary with BKNP and Beringin Jaya is located in the BKNP buffer zone.

Bungan Jaya has four hamlets: Nanga Bungan, Nanga Lapung, Aso and Tona Kulan, whereas Beringin Jaya has only two hamlets Matelunai and Nanga Balang.

15 http://betungkerihun.dephut.go.id/tentang_kami.html

Table 1. Key facts for Pilot 2.

Villages	Beringin Jaya	Bungan Jaya
Sub-district / Kecamatan	South Putusibau	South Putusibau
Hamlet	Nanga Balang, Matelunai	Nanga Bungan, Nanga Lapung, Aso and Tona Kulan
Population[1]	545 (118)	581 (109)
Number of sample HH	40	40
Major ethnic groups	Dayak Buket, Punan	Dayak Punan
Number of HH involved in:		
Dryland agriculture	36	28
Rubber garden[2]	28 (6)	13 (1)
Animal husbandry[2]	18 (2)	26 (8)
Fish ponds	1	1
River fishing[2]	32 (6)	37 (2)
NTFP extraction[2]	37 (7)	30 (6)
Timber extraction[2]	4 (2)	4
Traditional gold mining	36	35
Other livelihoods	12	18
Education facilities	Elementary school (2 units)	Elementary school (2 units)
Health facilities	Village clinic (Polindes)	Village clinic (Polindes)
Village development Program/Project	PNPM (2009, 2010)	PNPM (2009, 2010)
	Agriculture Agency (2008)	WWF (2006, 2010)
	WWF (2008)	Betung Kerihun NP (2009)
	Betung Kerihun NP (2009)	

Note: Figure in bracket represents:
1 Number of Households (HH)
2 Number of HH generating income

Both villages administratively gained village status under the village expansion program in the 2000s.

Both villages have two different Dayak sub-ethnic groups, namely the Punan in Bungan Jaya and the Buket in Beringin Jaya. According to Bamba (2008) the Buket isin the minority when compared to other sub-ethnic groups across Kapuas Hulu[16]. They are found in two separate villages; Nanga Hovat in the upper Mendalam River and Mate Lunai hamlet (Beringin Jaya village) in the upper Kapuas River.

The Punan sub-ethnic group is predominantly found in the upper Kapuas Basin. They traditionally lived a nomadic lifestyle. However, they became a sedentary community due to the influence of Christian missionaries during the eighteenth century. They do not recognize the long house culture as practiced by other sub-ethnic groups such as the Iban, Taman and Tamambaloh (Bamba: 2008, p.256). In addition to Bungan Jaya village, the Punan also live in villages such as Tanjung Lokang, Nanga Enap, Nanga Erak, Sepan, Salin and Belatung.

This Pilot report explores the livelihoods of the communities in the Pilot 2 area, examining the impact of remoteness and the bordering conservation area, BKNP. Key questions include how do communities interact with the natural resources around them and in what ways could the forest improve their livelihoods? To what extent have recent economic opportunities improved livelihoods and what are the associated environmental risks?

The household survey randomly selected and interviewed 40 households per village. In Beringin Jaya only 39 households were interviewed as many of

16 Bamba, John (ed.) (2008) Mozaik Dayak: Keberagaman subsuku dan Bahasa Dayak di Kalimantan Barat, Institut Dayakologi, Pontianak

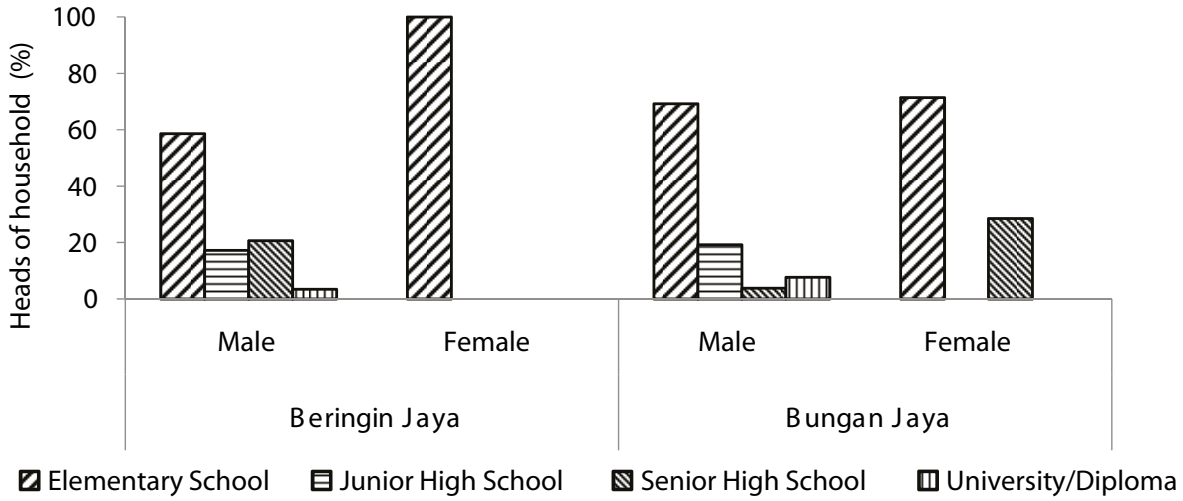

Figure 2. Level of education of heads of households (male and female).

them are involved in mining activities and were away from the village at the time of the survey.

Generally, people in these villages manage their livelihoods by utilizing forest and mineral resources. The main livelihoods of these communities are hunting and gathering NTFPs, such as rattan and *gaharu* (agarwood). Agriculture, including rubber planting, is not considered a main source of income and contributes very little to the local livelihoods[17]. However, dryland agriculture and river fishing are important for subsistence.

The main income-generating activity is traditional gold mining. A tray or pan is used to sieve the gold from the gravel or other material. This method is the easiest and traditionally the cheapest for household-level mining. However, for commercial purposes this method is very costly as it is very labor intensive.In addition, the traditional gold-mining technique has been replaced by suction machines, which are put on a platform to suck up the sediment from the bottom of the river. The water and sediment flow down to a carpet, which captures the gold particles.

It is highly evident that gold mining, using a suction machine, in the river causes negative, environmental impacts, including sedimentation. The miners and community in Pilot 2 have agreed to operate pumps at a maximum diameter of 4 inches in an attempt to reduce the negative environmental impacts.

The level of forest dependence of people from both villages is clearly shown by the amount of NTFPs collected, with timber harvesting for domestic use only. More than two-thirds of the population remains dependent on the forest for non-timber products, but also timber. Other incomes generated from non-farming activities, such as artisan activities, employment (civil servant) and transportation businesses, are important for supporting the local economy.

2. Results

2.1 Population and Education

The education level of heads of households in both villages was low (Figure 2). Less than 20% had continued to junior high school, just over 20% to senior high school and less than 10% had gone to university. Low levels of formal education were mainly caused by limited higher education facilities in the villages as well as poor transportation infrastructure.

Individuals of working age (15–60 years old) are essential for development in the area. Young people represent around 20% of the population, which will produce some of the labor for the community in the next 10 years. The older population (>60 years old) is now about 5% to 8% of the population, but will increase as the productive age joins the cohort in the future (Figure 3).

17 Hermas Rintik Maring (2007) http://rafflesia.wwf.or.id/library/attachment/pdf/Feature_Jr3.pdf

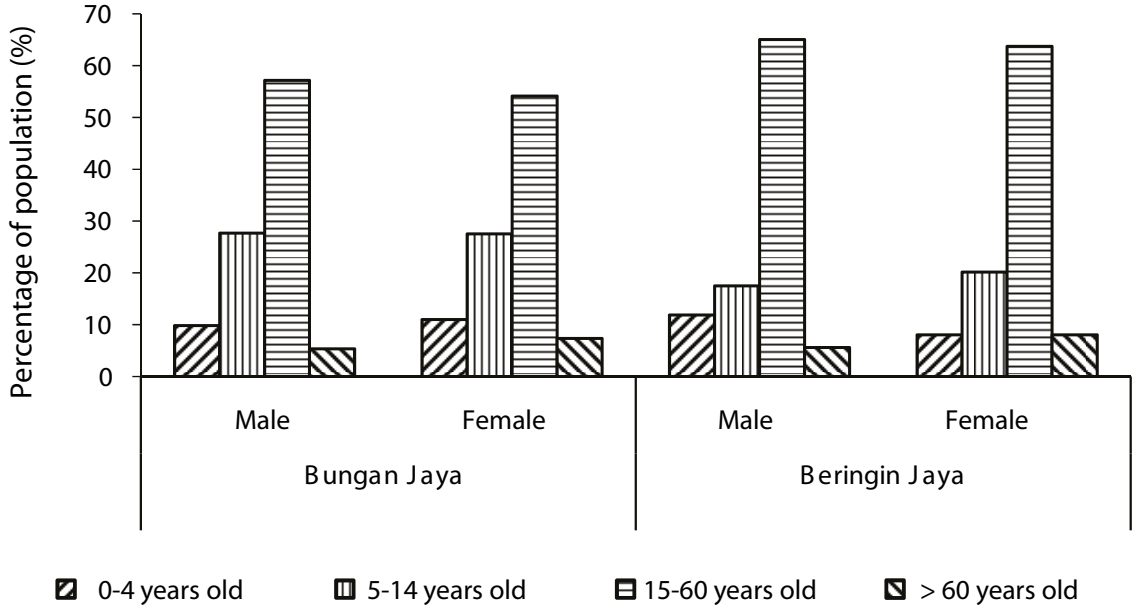

Figure 3. Age composition of Pilot 2 respondents.

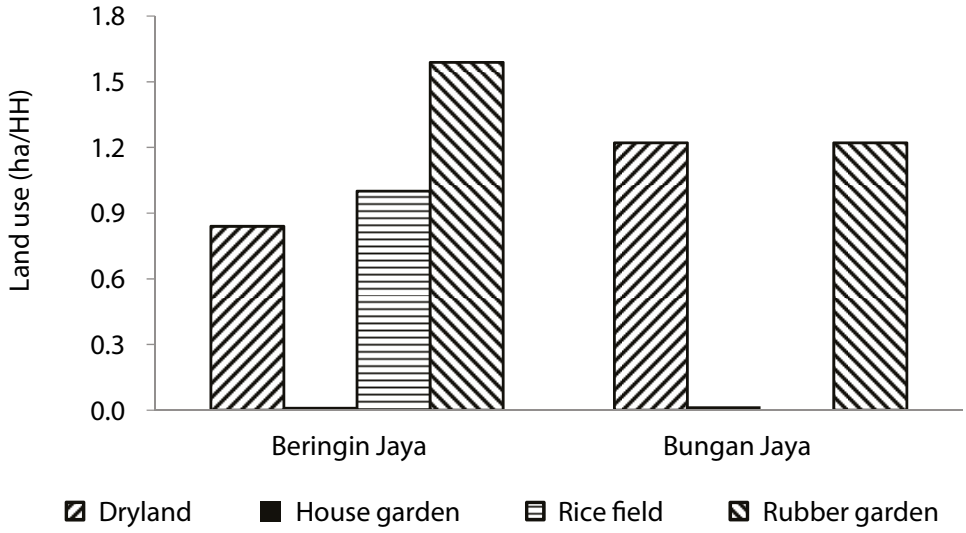

Figure 4. Land use in Pilot 2 (in hectare).

2.2 Land use

As discussed above, land-based activities are still important for subsistence. Agricultural practices are similar to other parts of Kapuas Hulu where they practice swidden (slash and burn) agriculture. However, unlike other parts of Kapuas Hulu, the villagers rarely grow rubber on their fallow land, mainly due to the low yield and higher income from mining.

Figure 4 shows that the average dry field used in Bungan is larger than that of Beringin Jaya although the number of households involved in dryland agriculture, is far fewer. Only a few households maintain their house garden for agriculture and very few households open paddy.

2.3 Livelihoods and economic analysis

The local community is rarely involved in rubber in Bungan Jaya although they own rubber plantations and of these owners only one household generates an income from rubber. Similarly in Beringin Jaya, 28 villagers own rubber plantations, but only six households harvest the rubber in order to generate

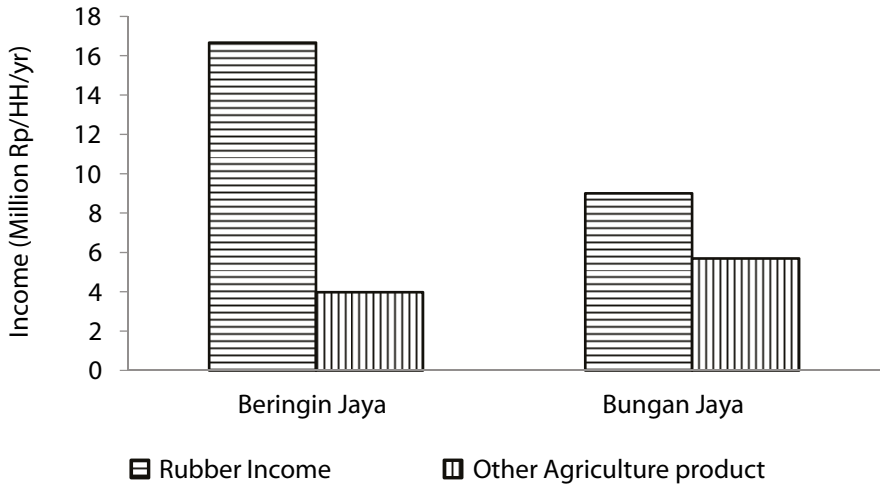

Figure 5. Average annual income from agriculture (Rp/HH).

income. Rubber harvesting can generate a significant return, but gold mining continues to generate a much higher cash income (see Table 1 and Figure 5).

Swidden agriculture is mainly for subsistence with the villagers growing both rice and maize. The value for subsistence agriculture is also important and worth annually around Rp3.7 million–Rp5.5 million per HH.

The main costs for agriculture are fertilizers, herbicides, etc., and labor. Only a few farmers can afford to use them to maintain the quality of the crops and minimize impact from pests and other natural disturbance.

The farmers in both villages still use family labor. Most activities such as opening and preparing the land are conducted collectively with other members of the village. The farmers work with a reciprocal labor system by providing food and drink during community work on her/his land and then help with the work on other people's land.

Animal husbandry plays an important role for both income and savings/investment. On average, cash income from animal husbandry is worth around Rp603,000 in Beringin Jaya and Rp488,000 in Bungan Jaya annually. In Bungan Jaya, income from animal husbandry is reported mainly from the sale of chickens.

Not all livestock are for sale; many are used as a form of household savings. We make a comparison between saving and selling value to discuss relative importance. In Pilot 2, the livestock saving value in Beringin Jaya was about Rp377,000, while in Bungan Jaya the livestock saving value was larger than its cash value (Figure 6).

Animal husbandry, as a form of saving, is a practical tool for ensuring against future vulnerability and risk. However, there is the risk that animal disease may impact negatively on livestock and therefore its future value. In Beringin Jaya, households reported a disease that affected chickens and subsequently reduced the income from animal husbandry.

In addition, river fisheries generate significant income especially in Beringin Jaya (Figure 6). Villagers catch fish for commercial purposes like *seluang (Rasbora* spp.*), tengadak (Barbonymus* spp.), *Tapah* (*Wallago* spp.) and *semah (Tor* spp.*)*. The latter is popular as a high quality fish for consumption and at the farm gate the price can reach about Rp300,000 per kg. Malaysia is a captive market for semah and the free on board (f.o.b) price may reach about Rp800,000 per kg[18]. While catching *semah* offers a promising return, its population is threatened by overfishing. According to the village community, businessmen from Putussibau hire local fishermen to catch the fish and provide financial assistance so that fresh fish can be frozen and transported to Putussibau.

More than two thirds of the population in Pilot 2 is involved in fishing, mainly for daily consumption.

18 http://www.pontianakpost.com/index.php/*?mib=komentar&id=92821 Dihargai Rp800 Per Kilo, hingga Sisik Enak Dimakan, Sabtu, June 4, 2011.

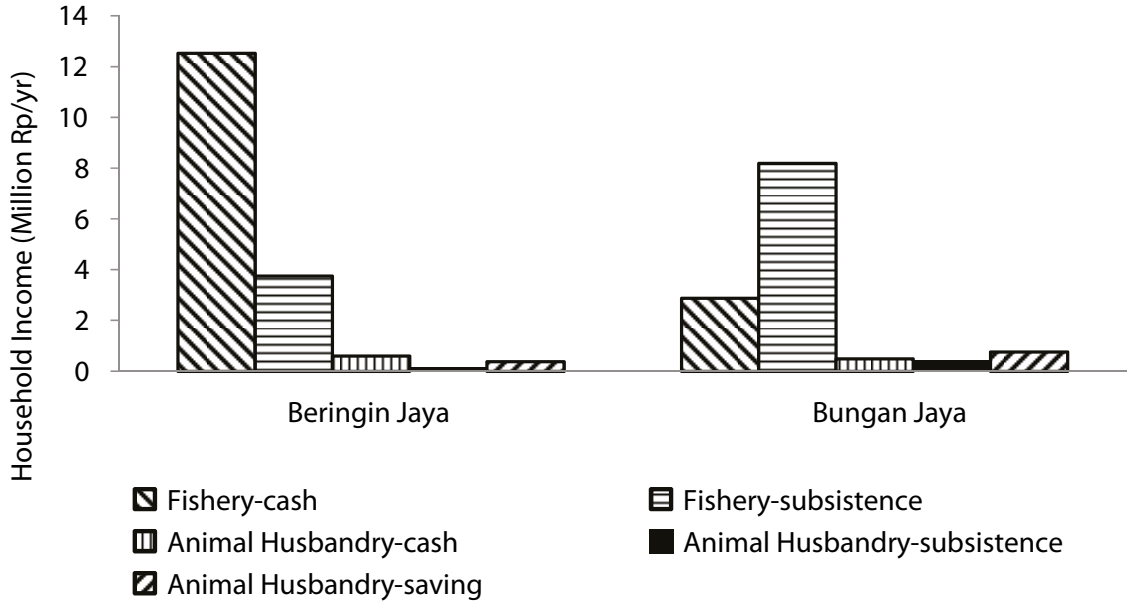

Figure 6. Average annual income from fishing and animal husbandry (IDR/HH).

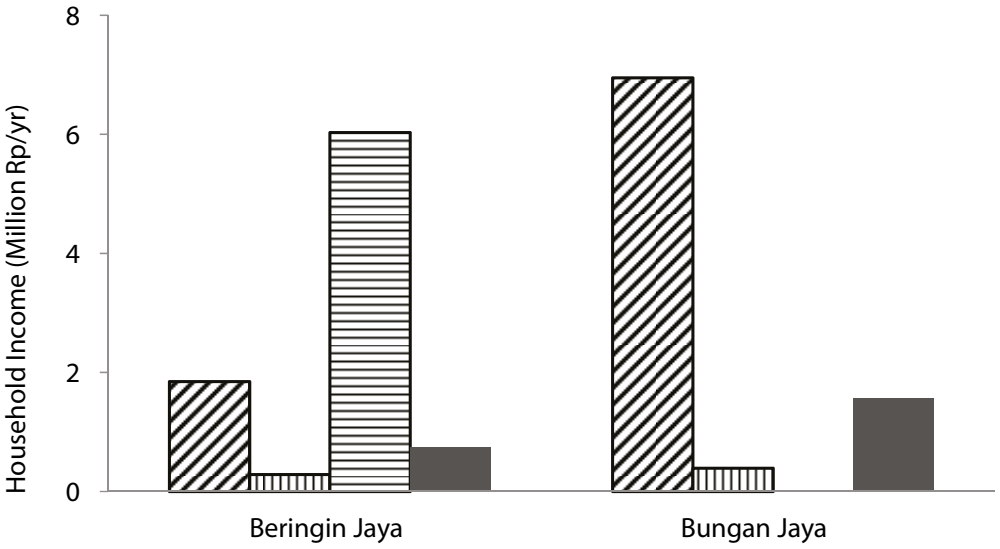

Figure 7. Average annual income from forest products (Rp/HH).

Compared to Beringin Jaya, subsistence income from fishing in Bungan Jaya is higher at around Rp8.1 million/HH/year.

NTFP collection is still important for these villages especially for subsistence. Forest products for food and housewares are the most dominant uses. Moreover, some products generate cash income, among others, *tengkawang* nuts, game (especially wild boar), fruits like durian and lychee, and also *gaharu*.

Gaharu has significant economic value especially for villagers in Bungan Jaya and is mostly collected from the surrounding forest area. It can be sold at a local price of nearly Rp300,000 per kg. Villagers sell the raw materials while processing takes place higher up the chain. *Gaharu* needs to be processed through distillation in order to extract its aromatic oil.

Although the economic benefits from timber are higher than non-timber products, timber benefits are often distributed among only a few people.

Table 2. Representation of costs and benefits of gold mining in Pilot 2.

Component	Description	Amount (Rp)	
Gross Revenue	**25 rial (3.3 gr) @Rp1,150,000**		**28,750,000**
Operating Cost:			
Fuel	5 drums @ Rp1,680,000	8,400,000	
Lubricant	20 litre @ Rp24,000	480,000	
Sub total		*8,880,000*	
Accommodation:			
Rice	10 sacks @ Rp170,000	1,700,000	
Sugar	30 kg @ Rp12,000	360,000	
Coffee	5 kg @ Rp35,000	175,000	
Instant noodles	5 boxes @ Rp60,000	300,000	
Salt	5 boxes @Rp15,000	75,000	
Cooking oil	18 kg @ Rp17,000	306,000	
Cigarettes		640,000	
Sub total		*3,556,000*	
Marketing costs, Village – Putussibau:			
Fuel	160 litres @ Rp8,000	1,280,000	
Lubricant	7 litres @ Rp24,000	168,000	
Sub total		*1,448,000*	
Total Cost			**13,884,000**
Net profit			**14,866,000**
Profit per person	5 people working on one platform		2,973,200

The benefits from NTFPs, on the other hand are shared among the wider community (Figure 7). The use of timber for subsistence is equally important and its value is between Rp700,000 to Rp1.5 million/ HH/year.

As mentioned earlier, the villagers have been involved in gold mining for many generations and it has become a dominant source of income in both villages. Traditionally they used panning to collect gold grains and then amalgamated them. However, they now use suction pumps to suck the sediment out and collect the grains from the sliding carpet on the platform. Gold mining platforms are worked by 3 to 5 people and typically operate for about 3 weeks. They return to the village once a month with the entire yield and sell it in Putussibau. At the same time, they also purchase mining supplies such as fuel and food for the next trip. The profit varies depending on how much gold is collected after accounting for the cost of fuel and accommodatioTable 2. Representation of costs and benefits of gold mining in Pilot 2.n (Table 2).

On average, gold mining in Bungan Jaya generates an income of up to Rp38 million per household/year or about Rp3 million per month (Figure 8). In Beringin Jaya the miners get lower yields and therefore on average they generate incomes around Rp15 million per household/year or about Rp1 million per month.

In addition to gold mining, villagers are also involved in various other forms of employment such as teachers, working as civil servants, village staff, merchants and as wage laborers. These jobs generate an income of around Rp16 million/year and Rp13 million/year in Bungan Jaya and Beringin Jaya, respectively (Figure 8).

Figure 9 shows that agriculture, fisheries and forest activities contribute to the household income, but are negligible compared to gold mining, which is very attractive in terms of cash income. Despite this, villagers manage multiple activities through labor allocation within the family. For instance, males often work as gold miners, while the women take care of the agriculture including crops.

Although the income generated from gold mining is much higher, household expenditures are also higher. Prices of goods in both villages are far higher than the market in Putussibau due to the high transportation

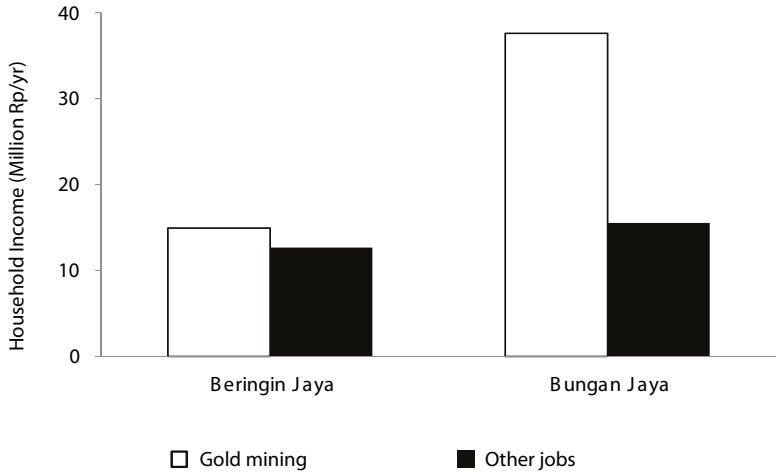

Figure 8. Cash income generated from non-farming activities (Rp/HH/year).

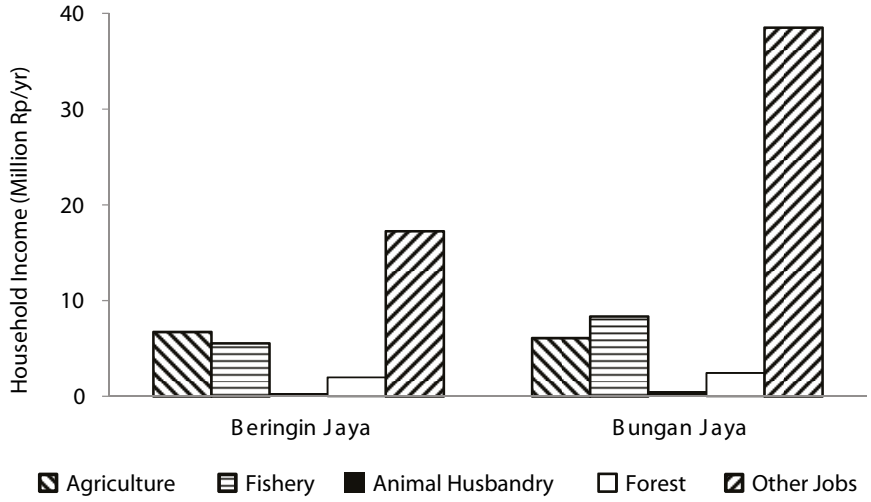

Figure 9. Income from various activities (Rp/HH/year).

costs of accessing the market. As a result, food is the highest contributor to household expenditure followed by transportation costs. The use of kerosene, diesel fuel and sometimes petrol for electricity also increases household spending (Figure 10).

Of concern, is that in both villages the proportion of money spent on cigarettes is similar to that spent on education. In Bungan Jaya, cigarette spending exceeds education expenditure. It should be a concern for any decision makers that poverty in the society may relate to income spending. In addition, this figure is also paralleled to national figures that indicate that cigarette spending is the second largest expenditure among the poor[19].

Assets are important to support livelihood activities, namely chainsaws, rifles and gold suction machines. Chainsaw and rifles possession in both villages is around 30% of the households which use them for forest-based activities such as cutting timber and hunting. Realizing gold mining is a lucrative business, several villagers have invested in gold suction machines to support their activities. In both villages, its possession is accounted about 5% to 13% of the household. With regard to transportation and communication assets, boats play a more important role than motorcycles (Table 4).

3. Critical issues

19 http://bisnis.vivanews.com/news/read/247162-orang-miskin-konsumsi-rokok-terbesar-keduaOrang Miskin Konsumsi Rokok Terbesar Kedua, 15 September 2011

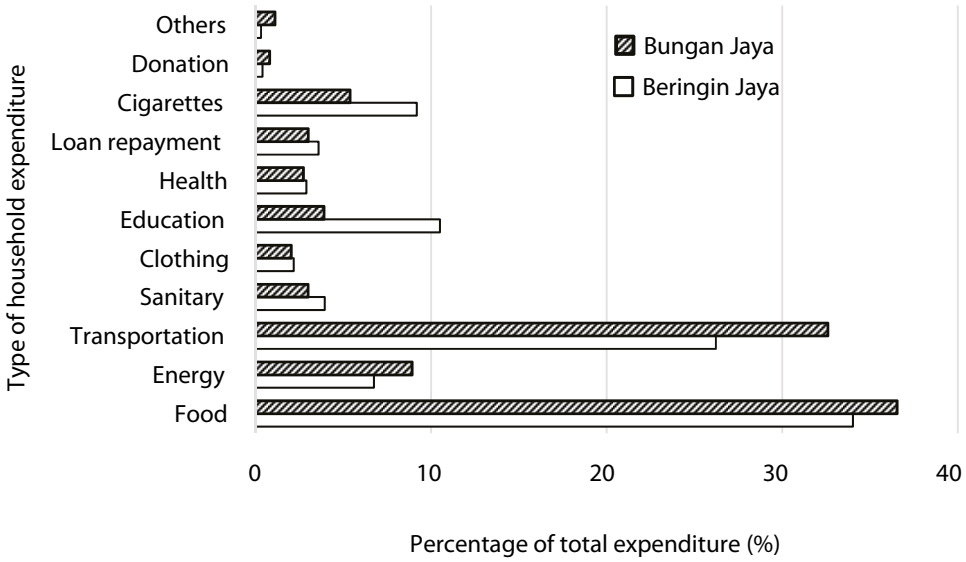

Figure 10. Composition of household expenditure (%).

Table 3. Average expenditure by category. (IDR/HH/year).

Component	Beringin Jaya	Bungan Jaya
Food	6,053,175	10,490,275
Energy	1,199,250	2,557,075
Transportation	4,664,025	9,359,700
Sanitation	700,250	859,250
Clothing	386,250	586,000
Education	1,868,000	1,119,575
Health	515,125	779,750
Loan Repayment	638,800	861,000
Cigarettes	1,632,750	1,545,875
Donations	71,972	230,250
Others	56,000	319,500

Table 4. Asset distribution across villages in the pilot area.

Village / Assets	Beringin Jaya		Bungan Jaya	
	N	%	N	%
Generator	15	38	27	68
Chainsaw	10	26	12	30
Rifle	12	31	14	35
Gold suction machine	2	5	5	13
Motorcycle	-	0	4	10
Outboard motor	26	67	37	93
Boat	36	92	34	85
Ancient jar	8	21	5	13
Cellular phone	11	28	22	55

3.1 Ecosystem services provided by BKNP

BKNP is home to rich biodiversity with 695 identified plant species of which 50 species are considered endemic to Borneo, 301 bird species of which 15 species are migrant birds, and key mammals such as orangutan (*Pongo pygmaeus*), sun bear (*Helarctosmalayanus*), Bornean slow loris (*Nyctice buscoucang*), macan dahan (*Neofolis nebulosa*) and horsfield's tarsier(*Tarsius bancanus*), also many species of fish such as red mahseer (*Tor tambroides*), *ikan batu* (*Epalzeorhyncuskallopterus*), *langkung* (*Hampalabimaculata*), *kebali* (*Osteochyllus* spp.) and *seluang* (*Rasbora* spp.)[20].

In terms of ecosystem services, overall BKNP is estimated to contribute as much as 8.1% to the major Kapuas watershed, which has a catchment area of 9,874,910 ha[21]. BKNP is one of the only trans-frontier reserves in Asia, which is connected to Lanjak Entimau Wildlife Sanctuary in Sarawak Malaysia. In this light the BKNP area is also a focus of transnational cooperation under the Heart of Borneo program involving Indonesia, Malaysia and Brunei Darussalam.

Kapuas Hulu as a conservation district was an initiative involving Kapuas Hulu District and Malinau District in East Kalimantan. There has been

20 http://betungkerihun.dephut.go.id/eng/about_us.html last accessed on 1 October 2011

21 Ibid.

a debate among local decision makers that being a "conservation district" the district should be entitled to some benefits, although this has not happened yet. The development of an ecosystems payment mechanism (Payment for Ecosystem Services – PES) could be a solution. There is therefore a need for clarity; who pays and who gets the benefits needs to be identified.

Recently the Government of Indonesia (GoI) and US Government agreed and signed a Memorandum of Understanding on debt for nature swap under the Tropical Forest Conservation Act 2 (TFCA-2) framework, equating to the amount of US$28.5 million[22]. Under this framework the GoI would swap debts for the conservation of tropical forest with a focus on selected districts namely Berau and West Kutai District in East Kalimantan Province and Kapuas Hulu District in West Kalimantan Province. The program will include partners such as the World Wildlife Fund (WWF) and the Nature Conservancy and will involve other relevant stakeholders, especially civil society. It is expected to support low carbon emission development programs and thus contribute to the GoI's commitment to lower carbon emissions by up to 41% while maintaining economic growth at about 7% by 2020.

Therefore projects related to this agreement are expected to commence in the near future, bringing stakeholders, especially the local government, local communities and park management to the table and to collaborate.

3.2 Potential eco-tourism destinations within BKNP

BKNP is known as a tourist destination, especially for nature enthusiasts and more adventurous tourists. The park management and a local tour operator, Kapuas Hulu ecotourism community (KOMPAKH–*Komunitas Pariwisata Kapuas Hulu*) have identified several points of interest for tourists. The development of ecotourism in Kapuas Hulu is also supported by WWF. This collaboration aims to bring in special interest tourists to enjoy the nature and cultural experiences of BKNP. One of the most challenging and also adventurous experiences is exploring the upper Bungan and Kapuas rivers with numerous rapids and several cascades.

In order to support ecotourism in BKNP, park management and KOMPAKH have been disseminating information related to tour packages, accommodation prices, etc., through a number of websites[23]. KOMPAKH have also linked with a German tour operator, One World Tours, to bring in more visitors to Kapuas Hulu. This has created some employment for locals with jobs such as porters and cooks.

3.3 Logging in Upper Kapuas and Mendalam watersheds

Among the eight concessions granted by the Ministry of Forestry within Kapuas Hulu District, only four are reported as active concessions. One of the active concessionaires is PT. Toras Benua Sukses, which has been granted a 24,920 ha concession between Sibau River and Mendalam River (SK. Menhut No. 107/Menhut-II/2006, April 11, 2005). There is a potential overlap and impact on the area's ecosystem services and functions.

Communities, especially in the upper reaches of the Mendalam River, remain opposed to any timber operation. They have witnessed the damage caused by concessionaires in the past, especially the damage to water quality (landslides etc.). Therefore, according to the community, PT. Toras has not operated in Mendalam area yet, but they are operating from the side of the Kapuas River where another community is being relatively cooperative. In the future, the communities of Mendalam watershed are concerned as to whether the concessionaire will expand its operations into their area. Within the community there is disagreement on whether the community should ban logging in the area, however, the majority still oppose any concession.

3.4 Gold for cash but also environmental risks

Gold mining in this area has historically been practiced using traditional methods, however, new suction machinery is now used to improve productivity. The use of suction machinery has further increased the risk of negative environmental impacts. The communities are aware of this and have agreed among themselves to use a smaller diameter of suction pump so as to minimize the risks, especially the risks to the river ecosystem.

22 Indonesia dan Amerika sepakati pengalihan utang, http://www.antaranews.com/berita/277590/indonesia-dan-amerika-sepakati-pengalihan-utang, Antara News, Thursday September 29, 2011

23 http://betungkerihun.dephut.go.id, http://kompakh.org; last accessed on 1 October 2011

From a government perspective, community mining is considered illegal as it has no license to operate and does not comply with mining's best practices as regulated by national and district regulations. However, the local community has been gold mining in the area for many years. Although it has evolved into a more mechanically operated system, the community still does not have any formal permit. In their view, applying for a permit for small-scale mining might be too costly and most people could not afford it. This is possibly the main reason the local people do not apply for a permit.

As shown above, mining generates significant cash income, and thus a change of livelihood for communities would be difficult to encourage. The opportunity costs of other livelihoods are very high compared to gold mining unless gold reserves decline sufficiently. The government and community need to work together to find alternative incomes that are suitable for this area. Realizing the environmental impact of mining for the miners and communities downstream, the government needs to carefully formulate policies so that changing community livelihoods can be established without creating social discontent.

Annex 3. Socio-economic study of villages in the Pilot 3 area: to what extent can people who live in remote areas benefit from development?

1. Background information to Pilot 3

The Pilot 3 area is located in the southern part of Kapuas Hulu District. The main road from Pontianak to Sintang to Putussibau dissects the lowlands from the hilly landscape to the south and east. Pilot 3 represents a variety of social and economic situations, which are different from the other pilot areas.

Malay is the main ethnic group living in this area together with several Dayak communities such as the Suruk sub-ethnic group in Tanjung village and Mayan in Benuis village. Malay ethnic groups, according to Bamba et al. (2008), represent the second largest ethnic population in Kapuas Hulu. They are known as "Senganan" to identify themselves as originating from Kapuas Hulu as well as Sintang.

The Senganan group is considered different from the Malay group from Sambas and Pontianak, which also resides in Kapuas Hulu district.

In terms of land use, rubber gardens dominate this area and, to some extent, have replaced traditional swidden agriculture. However, swidden agriculture is still practiced, especially for subsistence. Traditional mining activities are relatively intensive with both mining for gold both in the river and on land using different techniques.

The main road from Sintang to Putussibau is good quality and accessible throughout the year. However, access to villages from the main road is often difficult during the rainy season.

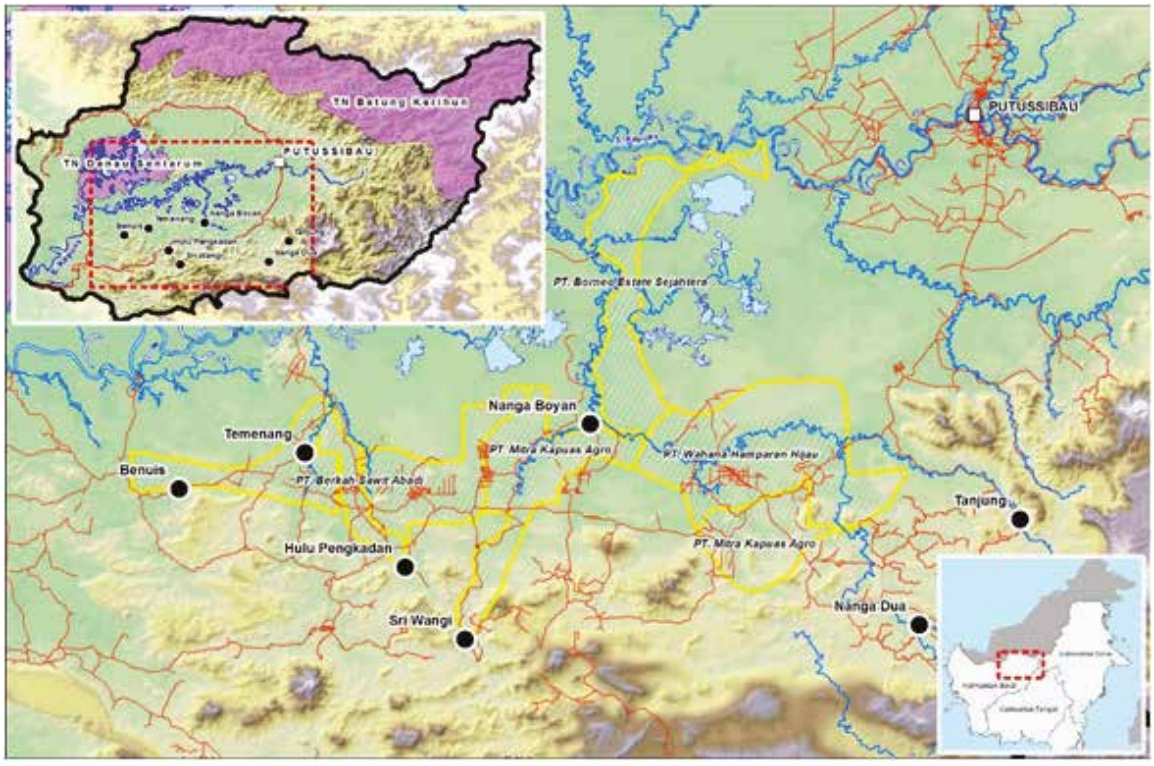

Figure 1. Map of Pilot 3 area in Kapuas Hulu.

Table 1. Key facts for Pilot 3.

Fact description	Tanjung	Nanga Boyan	Nanga Dua	Sriwangi	Hulu Pengkadan	Temenang	Benuis
Sub-district / Kecamatan	Mentebah	Boyan Tanjung	Bunut Hulu	Boyan Tanjung	Pengkadan	Jongkong	Selimbau
Hamlet	Roban, Biang II, Gurung Lengkung	Perbu, Landu Mentail, Penemur	Petika Jaya, Jerihai	Gurung Ladan, Tanjung Lanyan, Jemah	Suka Ramai, Tintin Kemantan	Gagak, Kelampai, Temenang	Rimba Panjang, Sawah, Lidung
Population	393	572	492	336	222	290	127
Number of sample, HH	40	40	41	40	40	40	40
Age group of sample:							
0–4 years old	21	22	14	15	15	8	12
5–14 years old	50	49	53	46	40	46	35
15–60 years old	112	150	103	113	126	109	127
> 60 years old	10	13	5	7	9	6	26
Major ethnic groups	Dayak Suruk	Malay mixed with Dayak and others	Dayak Mentebah	Malay	Malay	Malay	Dayak Mayan
Number of HH involved in:							
Dryland agriculture	33 (5)	9 (4)	26	25 (1)	19 (4)	13 (1)	32 (11)
Rubber gardens	(36)	(29)	-	(39)	(40)	(39)	(40)
Husbandry	32 (5)	19 (5)	15 (7)	23 (1)	27 (7)	32 (4)	33 (2)
Fish ponds	20	6	-	7	13	9	2
River fishing	29	21 (8)	25 (3)	18	19	20	20
NTFP extraction	37 (22)	22 (7)	20 (5)	26 (7)	22 (12)	20 (1)	30 (1)
Timber extraction	8 (3)	2 (1)	-	5 (3)	3 (2)	4 (0)	1 (0)
Traditional gold mining	(18)	(30)	(38)	(21)	-	(11)	(1)
Other livelihoods	(23)	(13)	(6)	(9)	(17)	(12)	(16)
Education facilities	Elementary school	Kindergarten, elementary school and junior high school	Elementary school	Elementary school and junior high school	Elementary school	Elementary school and junior high school	Elementary school and junior high school
Health facilities	Village midwife	Village clinic	Village clinic	Village clinic	Village clinic	Village clinic	Village clinic
Village' development Program/ Project	PNPM, Agriculture agency	PNPM	PNPM (infrastructure)	Village Budget Allocation (ADD), PNPM	Village Budget Allocation (ADD), PNPM, and ADB – CWSHP (community water services and health program)	PNPM, and ADB – CWSHP (community water services and health program)	PNPM, Forestry agency

Note: Figure in brackets represents the number of households who earn income from the activity

Table 2. Oil palm plantation permits and allocation.

Company name	Sub-district	Planted (ha)	Planted (stem)	Seedling (ha)	Seedling (stem)	Company Group	Permit Status
PT. Berkah Sawit Abadi	Pengkadan and Selimbau	0	0	0	0	BIA GROUP	Business Industrial Permit
PT. Borneo Estate Sejahtera	Bunut Hilir and Embaloh Hilir	0	0	0	0	BIA GROUP	Business Industrial Permit
PT. Wahana Hamparan Hijau	Bunut Hulu and Mentebah	0	0	17	60000	BIA GROUP	Business Industrial Permit
PT. Mitra Kapuas Agro	Bunut Hulu	0	0	0	0	BIA GROUP	Business Industrial Permit

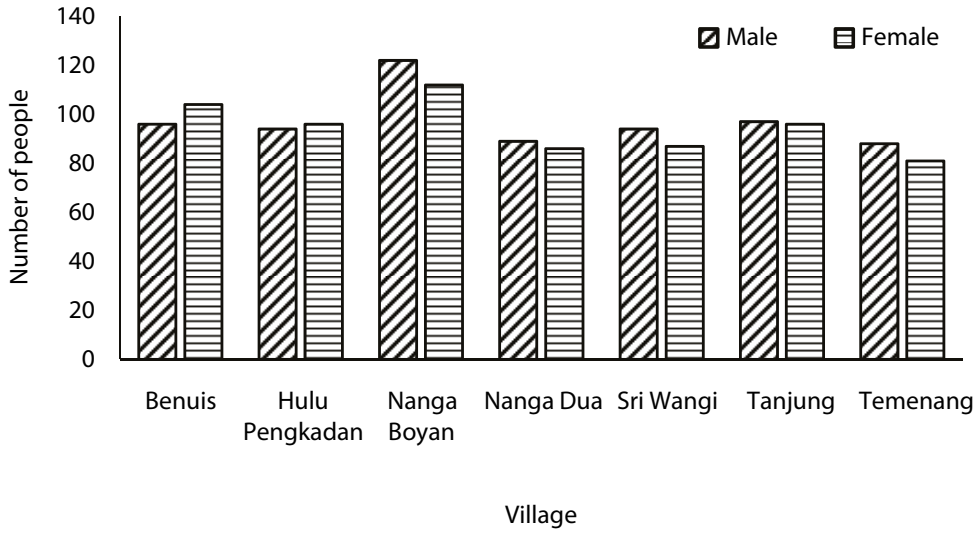

Figure 2. Household profile based on sex composition.

Land-based investment is not new in this area. Concessions have been allocated throughout this area in the past, starting with logging concessions and continuing now with oil palm plantations. The forest concessions are now inactive, but the local people still maintain logging activities and have benefited from the good road access to Putusibau or Sintang.

Although the local communities reported that the oil palm plantations have not yet started, several activities such as nursery development and community engagement projects have been initiated. These are indications that the oil palm plantation(s) will start soon (refer to Table 2).

Village administration during the survey time was in transition resulting from a recent village expansion program run by the local government. The data from the survey was based on the conditions before the village administration was expanded. Now, some villages have different configurations, for instance, Temenang has been split into two villages, and Nanga Boyan split into four villages. However, we do not expect this change to have any impact on the survey results.

2. Result

2.1 Population and Education

The demographic profile shows the population distribution by age group and sex, as shown in Table 1 and Figure 2. The profile of the Pilot 3 area indicates that the population of productive age (15–60 years old) is in the majority followed by the youngest group (0–14 years old). The early cohort (0–4 years old) is nearly 10% of the population for both male and female. All villages portray a balanced sex composition within the village, e.g., in Nanga Dua there are

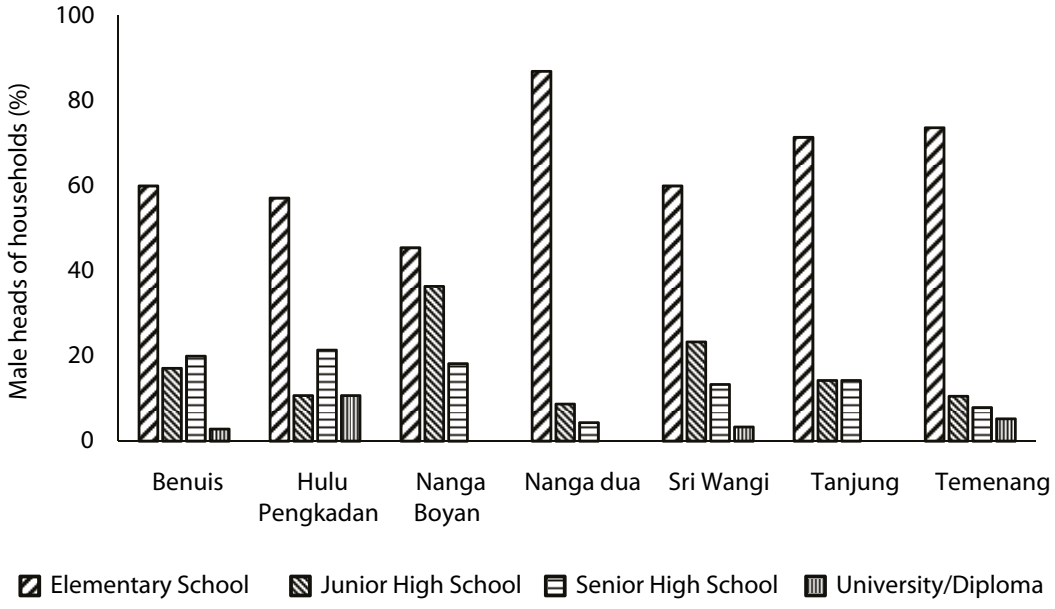

Figure 3. Education attainment of male heads of households.

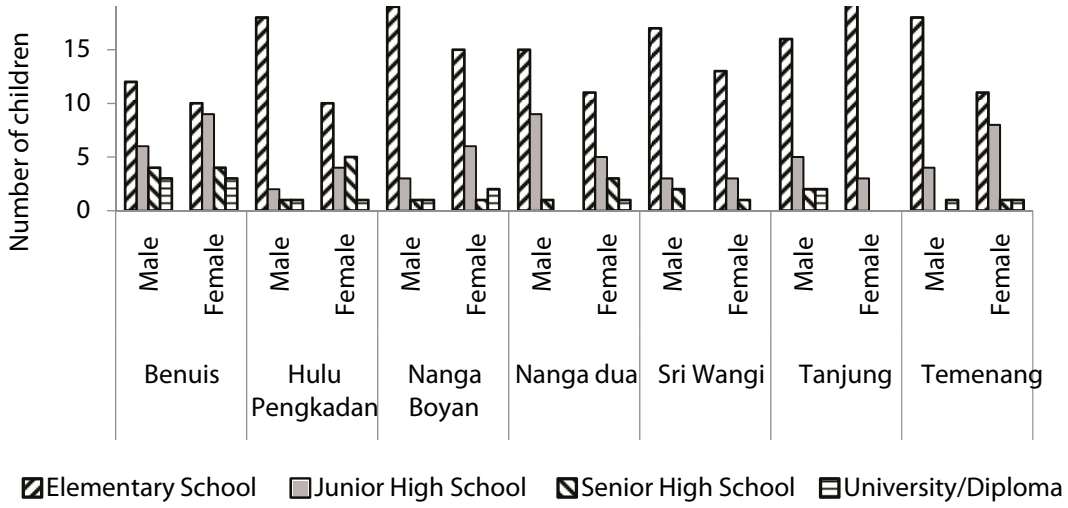

Figure 4. Number of children enrolled in school.

89 males and 86 females. A high number of the youngest cohort indicates that the population in Pilot 3 is growing.

The general picture for all villages in the Pilot 3 area shows that education attainment of the heads of households is relatively low with most only finishing elementary school (50–80% of the male heads of households)(Figure 3). About 10–30% continued to junior high school and senior high school. University graduates were less than 10% of the male heads of households in the village. Civil servants, teachers and village staff in the village were generally university graduates.

Figure 4. Number of children enrolled in school. Figure 4 shows that the majority of children go to elementary school as a basic education foundation. The number of children going up to high school was relatively low and the number entering university was the lowest. Many factors contribute to the inaccessibility of higher education, including the lack of the parents' education awareness coupled with a lack of funding to continue higher levels of study.

The latter may be related to the type of livelihoods the parents are engaged in and the cost of education, especially for people having to send their children to university in Sintang or Pontianak.

2.2 Land use

In general the local people in the Pilot 3 area practice swidden agriculture mainly for subsistence, but also additional income when the harvest provides a surplus. In many cases farmers have no alternative, therefore keeping land for agriculture is the only viable option. However, Pilot 3 is an exceptional case as the villagers do have other options that are economically attractive and accessible, for example, gold mining.

Traditional gold mining activities were found in every village in the Pilot 3 area, except in Benuis. People use different techniques, when they work on the land they spray the cliff with water in order to generate runoff and sediment. If they work on the water, the suction machine dredges the sediment from the bottom of the river. It is then spread over a carpet to collect the gold particles.

The fact that gold mining provides potential income for the miners is consistent with the pattern of land use in the area. In Nanga Boyan, land use for dryland agriculture is the lowest among the villages in Pilot 3. Similarly, land use in Temenang is about 0.88 ha/HH. On average, agricultural land in Pilot 3 occupies 0.8 to 1.1 ha/HH, whereas the size of rubber gardens varies from 1.6 ha to 3.6 ha/HH (see Figure 5).

Rubber-garden expansion is also another factor that is causing the decrease in dryland agriculture. In Temenang most available land in the village has been converted to rubber plantation. One respondent said that it took him 7 years to opening forest for his plantation (known as *berimba*), which he did so that his children will be able to inherit the rubber garden.

A typical rubber garden in the Pilot 3 area exhibits less biodiversity richness than the rubber gardens seen in Pilots 1, 2, and 4. In other pilot areas, rubber trees are interplanted with other crops such as fruits and other timber trees, whereas, in Pilot 3 the rubber is planted as a typical industrial plantation.

As the area available for agriculture is diminishing (as discussed above), other types of land such as rice fields are also used, along with house gardens, as places for agriculture. However, the area of these parcels of land is relatively small compared to areas for dryland and rubber gardens.

Figure 6 shows an estimation of the total area of land the villages use, which at its minimum is nearly 100 ha per village. This includes land for dryland and rubber gardens. The highest land use for a rubber garden was found in Hulu Pengkadan (about 140 ha) followed by Temenang and Tanjung. In terms of dryland use, community use is around 20 to 30 ha of land except for villages like Nanga Boyan and Temenang, dryland use is about 10 ha. Although gold mining is intensive in this area, the villagers still manage dryland, for example, Sriwangi, Tanjung and Nanga Dua.

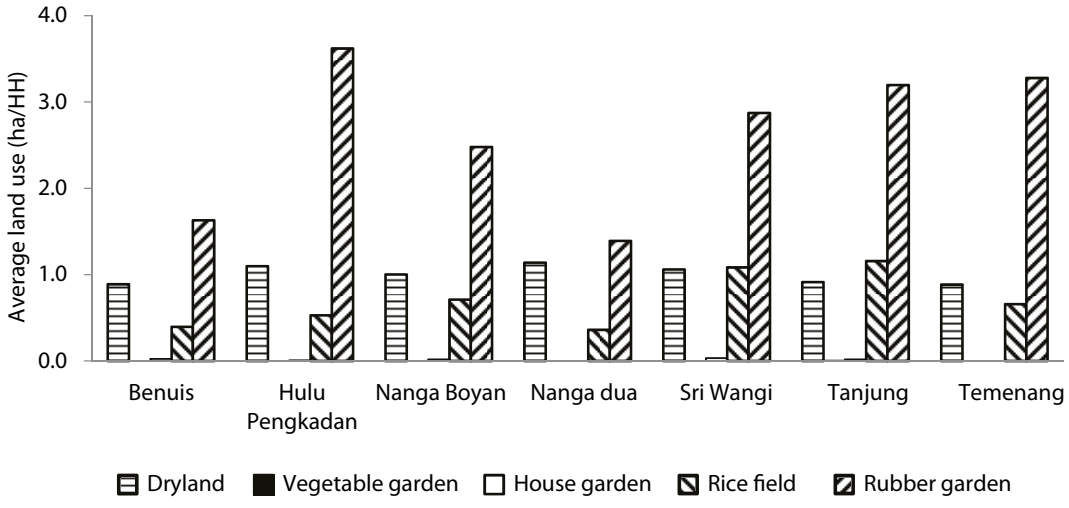

Figure 5. Average Agricultural Land use (ha/HH).

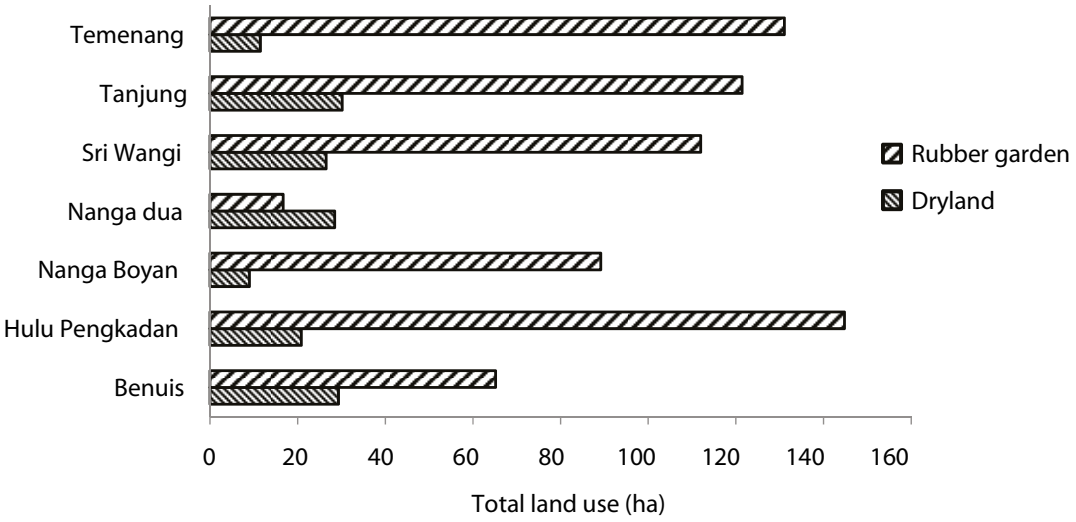

Figure 6. Total land use per village (ha).

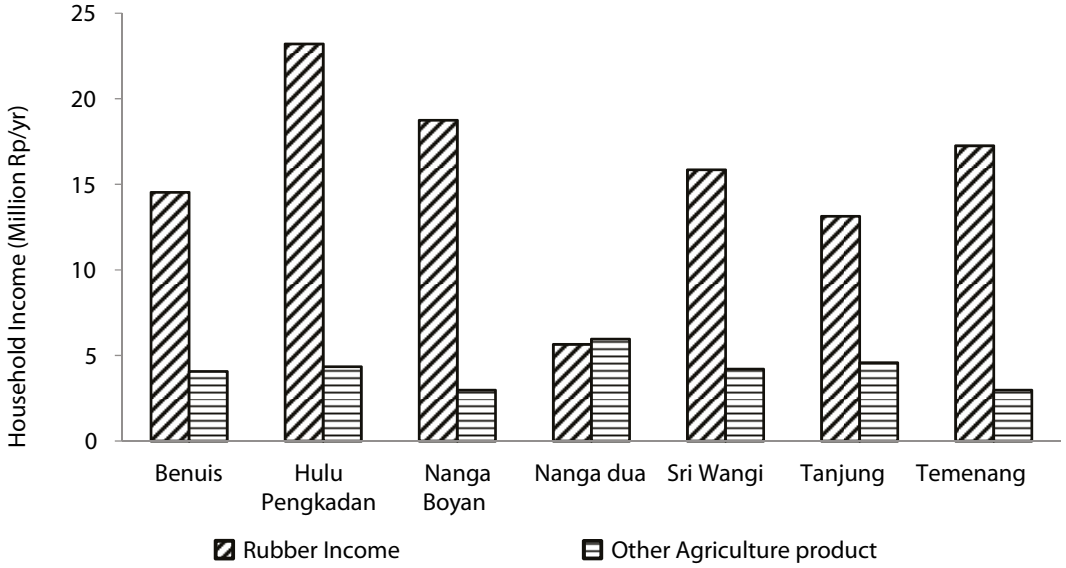

Figure 7. Average income from agricultural activities (Rp/HH/year).

2.3 Livelihoods and economic analysis

The extensive use of rubber is a result of the potential cash income that can be generated (Figure 7). In Pilot 3, an annual income of about Rp25 million from rubber is possible equating to an average of around Rp15 million to Rp23 million per household. In Hulu Pengkadan where there is no gold mining, rubber has become the main source of cash income and therefore their dependence on rubber is the highest.

In contrast, in areas where gold mining is prominent, people tend to use all resources for this business as it generates quick cash. Other activities are less attractive compared to gold mining as seen in Nanga Dua. Our respondents said that they rarely open land for rubber gardens since gold mining is still profitable. At the same time, there is a growing concern of village leader in Nanga Dua that gold might be depleted sometime in the future and if this happens the people will suffer. He is now encouraging his community to start planting rubber in anticipation of the 'drying up' of gold resources in the future.

As seen in Figure 8 above, in Sriwangi, Tanjung and Temenang income from rubber has exceeded that from gold. A lower income from gold might be due to declining gold stocks and thus lower production and income. While rubber has gained a relative

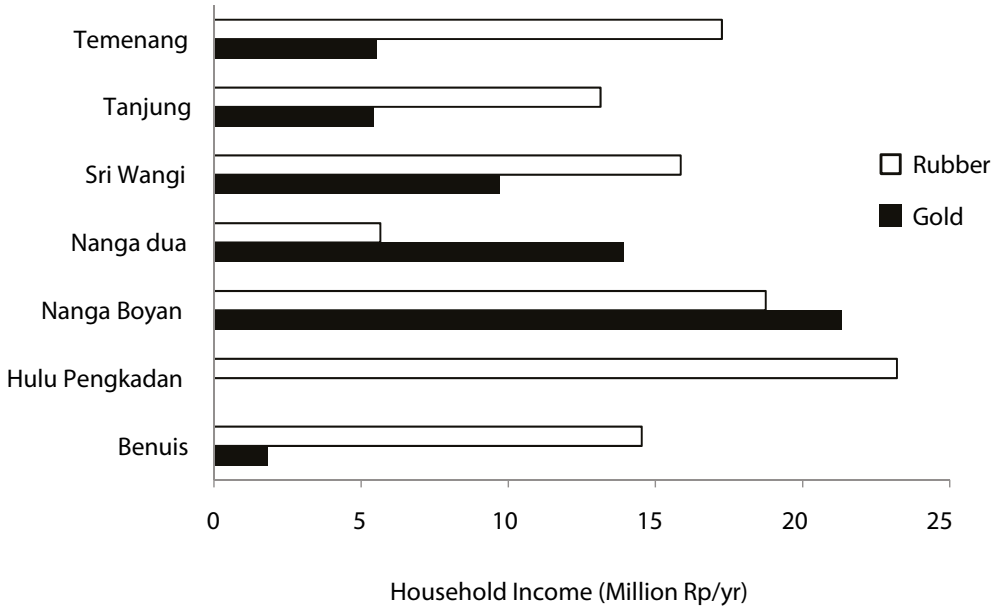

Figure 8. Comparison between cash income from rubber and gold mining (Rp/HH/year).

advantage over gold mining, there is an indication that villagers are diversifying their livelihoods by allocating available labor with in the family, i.e., females predominantly tap the rubber and men undertake gold mining activities.

Other agricultural products, mainly food crops, are for subsistence but sometimes people sell their products in the local market. Communities in Pilot 3 grow various crops such as rice and maize, and vegetables such as eggplant and spinach. Figure 7 shows the very low income from food crops compared to that from rubber. In Nanga Dua, the similar income from food crops and rubber suggest low rubber productivity.

The communities in Pilot 3 have gradually shifted from a subsistence economy toward a cash economy as indicated by the current village land use. In the past, villagers in Temenang were mainly engaged in rubber plantations as well as food crops. While the amount of land remains unchanged, most people in Temenang have converted their land into rubber plantations with only a few people still growing rubber and food crops.

This has resulted in a number of consequences. Firstly, land tenure becomes permanent as people grow perennial crops on the land, where the owner has several rights, e.g., the right to plant, to harvest and even to sell the land. Secondly, as food crops are produced mainly on dryland, villagers now tend to produce less food; instead they buy their food from the local market.

For many villagers in Pilot 3, rearing livestock is still an important source of cash income as well as providing an essential source of food (protein). Income generated from livestock is considered substantial among villages in Pilot 3. Hulu Pengkadan has the highest average income from livestock.

Most local people depend on fish resources for their daily diet; they grow fish in fishponds and catch fish in the neighbouring rivers. The main difference being that there are costs associated with managing fishponds such as seed and fish feed. Fish are also caught for family consumption. Both cash and subsistence are calculated in Figure 9.

The collection of NTFPs is still an important livelihood in the Pilot 3 area (Figure 10). Valuable NTFPs are often collected such as *gaharu* and *tengkawang* (*illepe* nuts). *Gaharu* (develops in *Aquilaria* after a fungal infection) is commonly used for fragrance, incense and perfumes. Five households reported generating income from *gaharu* in Tanjung village. Villagers search for *gaharu* not only within the village boundary, but also in other villages. They work in groups of 4–8 people and generate nearly Rp37 million annually or an average of Rp6 million per household.

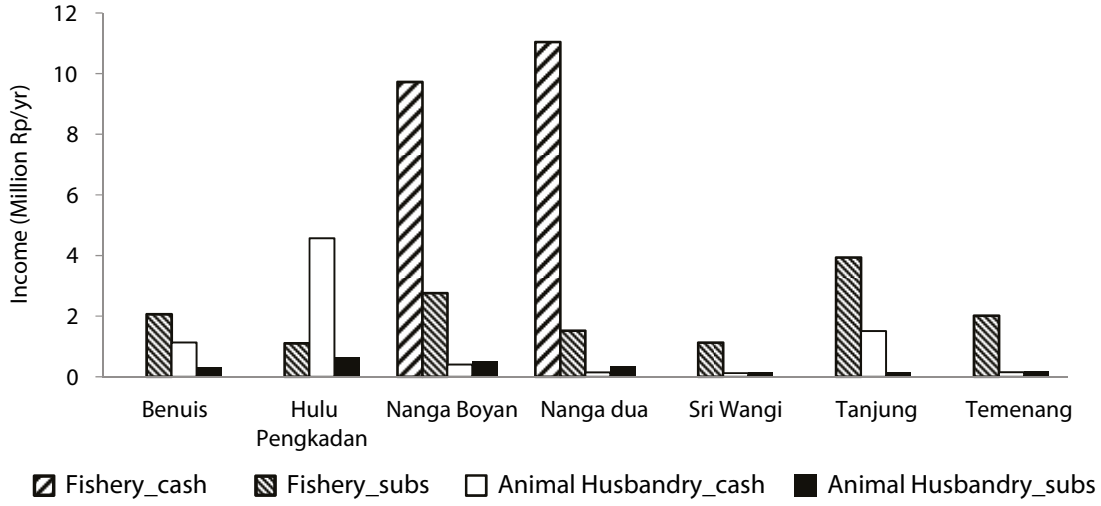

Figure 9. Average cash and subsistence income from fisheries and livestock (Rp/HH/year).

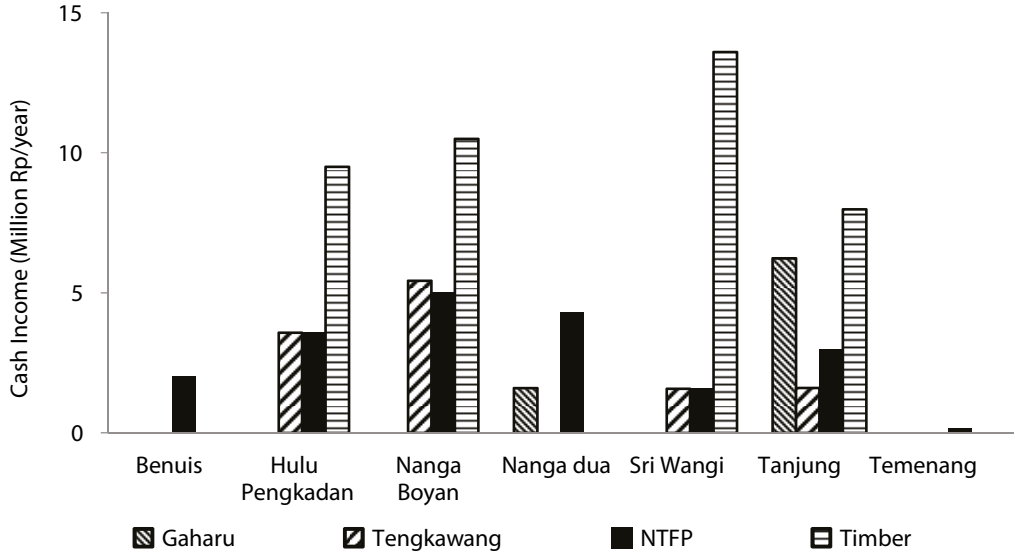

Figure 10. Average cash income generated from NTFPs and timber (Rp/HH/year).

Aquilaria has been submitted to Appendix II CITES, which means the status of this species is "threatened". *Gaharu* at the local level has been depleted as indicated by the increased distance travelled to gather it. *Gaharu* contributes significantly to the household income and if the resource is depleted in the natural habitat it has further implications for the stability of the local economy.

While we were conducting the survey in Benuis a team from the Forestry Agency distributed *Aquilaria* seeds for each household to plant on the degraded land around the village. Following this the trees will need to be inoculated with the fungi that produces *gaharu*. The farmers will be trained how to do this. The local communities will no longer need to seek *gaharu* wood in natural forest thus reducing the threat to the forest ecosystem. Similar programs have also been conducted in other villages, such as Pulau Manak.

Another NTFP, which also has an important economic value, is *tengkawang* or *illepe* nut (*Shorea* spp.). It is grown in Kalimantan and Sumatra especially in Kapuas Hulu, it is easily found in almost all of the villages. In Pilot 3, *illepe* nut collection was found in Hulu Pengkadan, Nanga Boyan, Sriwangi and Tanjung and generated an income ranging from

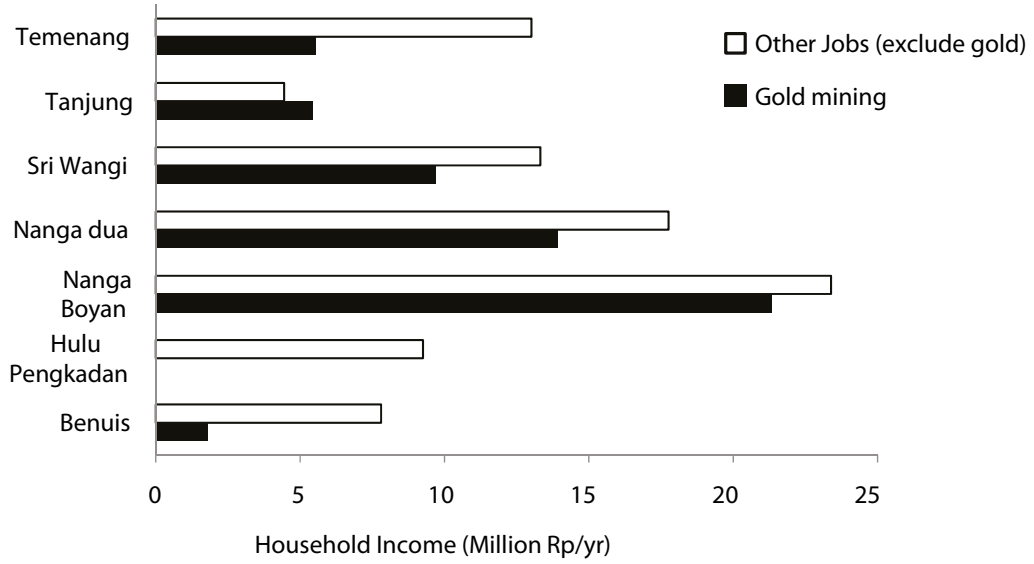

Figure 11. Comparison between income from gold mining and other jobs (Rp/HH/year).

Rp10 million to Rp40 million per village or an average of between Rp1.5 million to Rp5 million per household. In almost all villages in Pilot 3, NTFP collection contributes cash income for the community except in Temenang where the average income from NTFPs is very low. The villagers in Temenang still use NTFPs for subsistence, but when they are sold, the value is relatively low.

In the past there were several forest concessionaires that operated near Hulu Pengkadan, Nanga Boyan, Nanga Dua, Tanjung and Sriwangi villages. Having the resources and experience, community timber activities in these villages still continue. Sriwangi has the highest income from timber, mainly from Borneo ironwood (*Belian; Eusideroxylon zwageri*), which used as the main pillars in long houses. As the species is becoming rare, but local demand from surrounding villages remains high, its economic value is increasing.

Gold mining is one of the most important economic activities for local people in the Pilot 3 area. It is undertaken particular in Nanga Boyan, Sriwangi, Tanjung, Nanga Dua and Temenang. The miners suck the sand from the bottom of the river and then filter it through a carpet. Once the carpet has trapped the gold, the miners will carefully collect it.

They work in groups of 4–6 people, usually young men, departing from the village in the morning and returning at night. Occasionally they stay in a camp for several days if the location is far from the village. After working for about 3 weeks to 1 month, they take a break, during which time they sell the gold and prepare for the next trip.

These mining activities have been conducted for many years. The local government has also encountered problems with legalization of this activity. The local people do not normally apply to the district government for a license/permit and the district government does not have the capacity to monitor licenses in the field. In addition, gold mining causes severe environmental degradation especially in the river and surrounding areas. Sedimentation from mining has a significant impact on the environment often resulting in a change in the landscape and degradation of the river ecosystem, which in turn reduces biodiversity. Many villagers confirmed that fish stocks are decreasing in the rivers surrounding the mining locations.

In this pilot area the local people also engage in non-farming activities such as wage labor, local businesses, artisan work and other employment. Income from these activities also supplements agricultural income. Such opportunities are more widely available in this pilot area than in Pilot 1 and 2.

2.4 Household assets

Table 3 shows that mobile phones, satellite dishes, televisions and electric generators are common possessions among villagers in the Pilot 3 site. Mobile phones have spread very widely especially in rural areas as cellular providers have expanded networks throughout rural areas.

Table 3. Number of households who own assets by type in Pilot 3 villages.

Asset type	Benuis		Hulu Pengkadan		Nanga Boyan		Nanga Dua		Sri Wangi		Tanjung		Temenang	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Consumer goods:														
Generator	4	10	23	58	37	93	20	50	22	55	11	28	13	33
Refrigerator	-	-	3	8	2	5	-	-	3	8	1	3	4	10
Satellite dish	20	50	19	48	30	75	15	38	22	55	10	25	28	70
HP	22	55	30	75	34	85	9	23	27	68	17	43	22	55
Valuables:														
Ancient Jar	6	15	3	8	5	13	-	-	2	5	10	25	3	8
Gold jewelry	1	3	-	-	2	5	1	3	-	-	-	-	1	3
Livelihood assets:														
Chainsaw	2	5	5	13	4	10	2	5	9	23	5	13	2	5
Rifle	21	53	2	5	1	3	13	33	3	8	7	18	4	10
Sew machine	1	3	1	3	-	-	1	3	4	10	-	-	1	3
Gold suction machine	-	-	-	-	2	5	-	-	-	-	-	-	-	-
Transport assets:														
Motor cycle	18	45	33	83	22	55	17	43	23	58	14	35	31	78
Boat	-	-	-	-	28	70	22	55	14	35	6	15	27	68
Outboard motor	2	5	-	-	23	58	21	53	1	3	1	3	10	25
Car	-	-	-	-	1	3	1	3	-	-	-	-	-	-

Asset ownership, on the one hand, is a way to improve the local people's quality of life. For rural people the ownership of an electric generator, for instance, gives them better access to electricity, so that children are able to study easily. It also brings new information through television although its value may be good or bad. Unfortunately, in our study villages, local people often watch television for entertainment purposes only. Similarly, mobile phone ownership facilitates exchange of information and improved communication among people in the village and outside the village.

Availability of cash and assets owned are interrelated. Since access to basic services is still limited, people can only make use of some assets if they have cash. For example, local people obtain electricity from electric generators, but they also need to purchase gasoline, diesel or oil for their generators. In many cases, the generator is often not used because of a lack of cash to buy the fuel or they only use it on special occasions such as community functions.

Chainsaw ownership is common in the Pilot 3 villages with the most being found in Sriwangi. Owning some form of transport is an advantage for rural people in Pilot 3. In all villages, most of the people own at least a motorcycle about 30% to 70% of the households per village. Although the road access is difficult, a motorcycle is better than a car. River transport in Pilot 3 is still important in several villages such as Nanga Boyan, Sri Wangi, Tanjung and Temenang therefore having a boat and outboard motor are an advantage.

3. Critical issues

3.1 Gold for cash but also environmental risks

Gold mining in this area has been practiced traditionally for generations and is now operated using suction machinery in order to improve productivity. The use of suction machinery has further increased environmental risks. The communities are aware of this and have agreed among themselves to use a smaller diameter suction pump so as to minimize the risks especially to the river ecosystem.

Since mining generates significant cash income, any change of livelihood in the short- term would be very difficult to encourage or enforce. The opportunity costs of alternative livelihoods are very high when

compared to the short-term high-income gains that gold mining provides. The situation is only likely to change as gold reserves decline. The government and community need to work together to find alternative income opportunities, which are suitable for this area. Realizing the environmental impacts of mining, for the miners and communities downstream, the government needs to carefully take measures so that changing livelihoods can be established without creating social discontent.

Legality is another issue. The local communities operate small-scale mines, for which they do not have formal mining permits except local agreements between miners and the landowners. From the government's perspective, having no permit is considered illegal. While not having a permit might be illegal, the permits for small-scale mining activities are costly and most villagers cannot afford them.

3.2 Oil palm plantations will continue to operate

The Pilot 3 area is surrounded by oil palm plantation concessions (see 2. ResultTable 2). PT Wahana Hamparan Hijau, one of four concessions in the area, has already built a 17 ha nursery, the seedlings of which will be planted out soon in the new plantation. The company has supported the local community by renovating the Tanjung Intan village office, in Mentebah sub-district, in September 2011[24]. Many stakeholders, e.g., village heads and heads of sub-districts have expressed their acceptance of the company's presence in the area as the company claimed it may bring employment and by managing unproductive land, the community may prosper.

The company, according to regulations, must establish a plasma plantation. A plasma plantation is a plantation operated by smallholder farmers under a special scheme. The company provides assistance such as capacity building and marketing for the farmers. Minister of Agriculture Decree No. 26/2007 on Plantation Business Licensing Guidelines regulates the oil palm plantation companies and states that 20% of their land area must be allocated to plasma plantations. It also states that a farmer will manage 2 ha of the plasma plantation. In reality, at the national level, only a small number of companies comply with this regulation[25].

This scheme is also rather complicated. For example, if a subsidiary company is granted a concession up to 2,000 ha, to follow the regulation the company must set aside 400 ha as a plasma plantation. This would then be occupied by about 200 smallholders/farmers. The division of land for plasma can be particularly difficult if the concession area overlaps more than one village and could potentially lead to conflict among the communities.

3.3 Land use for rubber plantation

One of the alternative options for using land for agriculture is to use it for rubber plantations. Rubber has been a common livelihood in the communities for many years. The farmers have land-use options for agriculture and plantations proportionally or they can use most of it for plantation leaving a small area for seasonal agriculture. In some parts of the Pilot 3 area, as in Temenang, most of the land has been used for rubber plantation. As a consequence, farmers rarely grow seasonal crops preferring mostly to purchase their daily food instead.

In managing land-use options there is a need to take into consideration how much community land should be allocated to rubber/community plantations and how much should be for community farming. Land allocation between farmland and plantations also needs to balance the need for cash income with the ability to provide sufficient food. Too much dependency on cash income is a high-risk strategy as price fluctuations can have negative impacts on the community. Land use is all about ensuring a balance of different land uses, required to ensure sustainability in terms of the environment, social and economic conditions.

24 See http://www.borneotribune.com/kapuas-hulu/pemkab-gandeng-pt-fbp-bangun-kantor-desa.html

25 See http://en.indonesiafinancetoday.com/read/2201/Development-of-Plasma-Palm-Plantations-is-Facing-Difficulties

Annex 4. Socio-economic study of villages in the Pilot 4 area

1. Background information to Pilot 4

The Pilot 4 area is located in the western part of Kapuas Hulu district and shares boundaries with Malaysia in the north, Danau Sentarum National Park in the east and Sintang district in the west. It consists of six traditional villages namely Seriang, Tinting Seligi, Kantuk Asam, Laja Sandang, which are located near the border with Malaysia then Entipan is in the middle and Penai in the south. The pilot area was selected as several oil palm plantations have started activities in this area, which may have begun to shape the social and economic interactions of the people and resources.

In general, the land use in Pilot 4 comprises mainly dryland agriculture (rice, tubers, vegetables), rubber agroforestry, old tembawang (durian, *tengkawang* and other fruits), and oil palm plantations. There are several oil palm concessions (see Figure 1 and Table 2) around the area. Many have been operating as indicated on cleared land areas such as PT. Buana Tunas Sejahtera and PT. Sentra Karya Manunggal of Badau. In Nanga Silat sub-district oil palm plantations were developed before those in the north, where some are now at the stage of producing fruit.

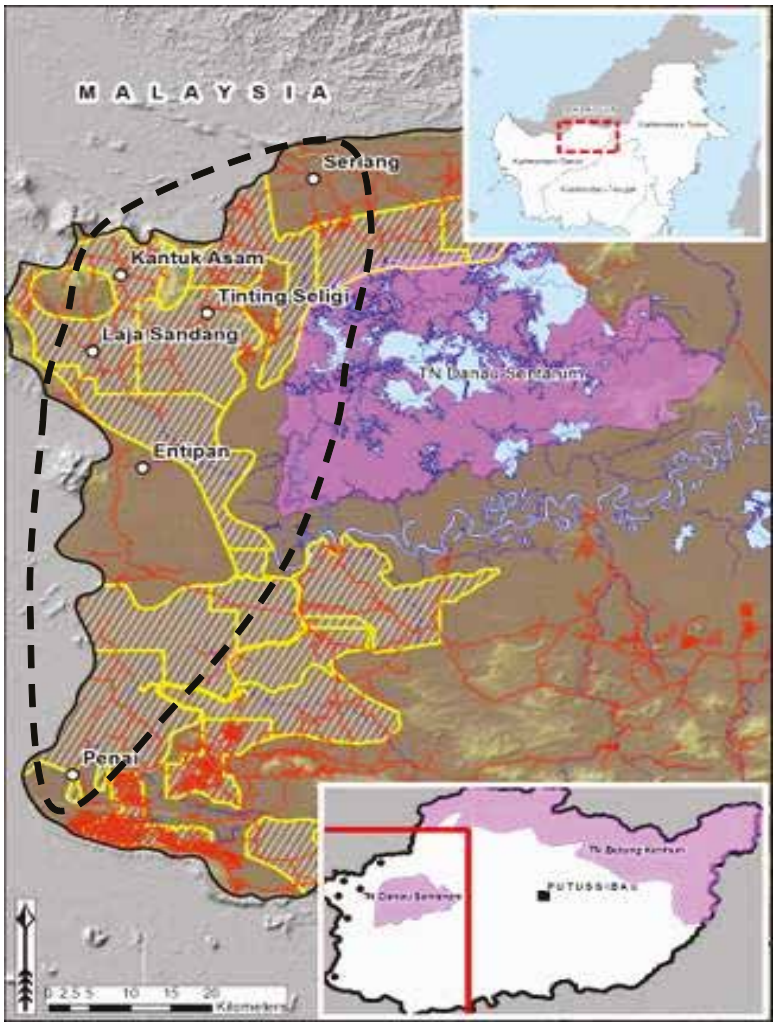

Figure 1. Map of Pilot 4.

This situation has the potential to impact community livelihoods. New job opportunities have emerged as oil palm plantations have been established in the area. Despite its economic benefits for community livelihoods, oil palm plantations are questioned with regards to their impact on downstream environments, especially on Danau Sentarum National Park.

In terms of land-use, the current population is considered to be low and thus utilize only a small area of land. But in the future this situation will change, potentially creating land use conflict. However, as the situation stands today, there is no clear indication whether people living around the concessions support or disagree with the recent progress.

2. Results

2.1 Population and education

Most of the people in this area are ethnic Dayak with different sub-ethnic groups, for instance, the Iban, Kantu and Sebaru. Dayak Iban and Kantu are widely distributed across Kapuas Hulu, whilst

Table 1. Key facts for Pilot 4.

Fact Description	Seriang	Tinting Seligi	Laja Sandang	Kantuk Asam	Entipan	Penai
Sub-district / Kecamatan	Badau	Badau	Empanang	Puring Kencana	Semitau	Silat Hilir
Hamlet	Seriang Hulu, Seriang Hilir	Sungai Telian, Sungai Tembaga, Empaik	Telutuk, Seridan, Sebangkang	Kantuk asam, Kersik Bungai, Kantuk Aping	Entipan hulu, Entipan Hilir	Swadaya, Beringin, Tanjung Keliling, Sungai Kuncit
Population (households)	645 (186)	648 (143)	705 (150)	409 (117)	843 (192)	1547 (577)
Family composition						
0-4 years old	3%	5%	5%	5%	13%	10%
5-14 years old	17%	21%	27%	22%	21%	26%
15-60 years old	68%	67%	64%	66%	63%	63%
>60 years old	12%	8%	3%	7%	3%	1%
Sex Ratio (m/f)3	1,09	1	1,23	1,1	0,93	0,98
Major ethnic groups	Dayak Iban	Dayak Iban	Dayak Iban	Mixed Dayak Kantu and Iban	Dayak Kantu	Dayak Sebaru
Number of HH involved in:						
Dryland agriculture	38	38	39	35	32	8
Rubber garden	(37)	(31)	(39)	(34)	(37)	(28)
Animal husbandry	40(9)	39(11)	39(14)	39(14)	34(3)	21(1)
Fish ponds	26	12(2)	2(1)	5	3	7(1)
River fishing	20	31	27	24	21	22
NTFP extraction	17 (4)	34 (5)	32 (8)	25 (5)	28 (6)	15 (1)
Timber extraction	1 (0)	11 (6)	13 (1)	7 (0)	12 (3)	2 (1)
Traditional gold mining	-	-	-	-	(12)	(18)
Other livelihoods	(16)	(30)	(25)	(38)	(11)	(16)
Education facilities	Elementary school, high school	Elementary school	Elementary school	Elementary school, junior high school	Elementary school	Kindergarten, Elementary school and junior high school
Health facilities	Village clinic	Village clinic, Village midwife	Village midwife	Village clinic	Village midwife	Village clinic, Village midwife
Village development Program/ Project	District development project (education, health), village budget allocation (ADD)		PNPM, District development project (education)	PNPM	PNPM, legislative aspiration fund	PNPM, District development project (education)

Note:
Figures in brackets represent the number of those households who earn income from the activities.

Table 2. Land allocated for oil palm plantation in Pilot 4.

NAME	Sub-district	Allocated area (ha)	Status (2011)	GROUP
PT. Katulistiwa Agro Abadi	Batang Lupar and Badau	14,000	Opened nursery and started to plant in 2012	BIA GROUP
PT. Buana Tunas Sejahtera	Badau	12,000	Land cleared and planting	SINAR MAS
PT. Sentra Karya Manunggal	Empanang and Badau	14,000	Land cleared and planting	SINAR MAS
PT. Kapuasindo Oil Palm Industry	Empanang and Semitau	14,000	n/a	SINAR MAS
PT. Anugrah Makmur Sejati	Seberuang and Silat Hilir	13,500	In operation	SINAR MAS
PT. Duta Nusa Lestari	Semitau	13,500	n/a	SINAR MAS
PT. Paramitra Internusa Pratama	Silat Hilir and Semitau	18,000	In operation	SINAR MAS
PT. Persada Graha Mandiri	Silat Hilir	18,000	In operation	SINAR MAS
PT. Riau Agrotama Plantation	Silat Hilir	12,000	In operation	SALIM
PT. Primanusa Mitra Serasi	Silat Hilir	18,000	n/a	SINAR MAS
PT. Kartika Prima Cipta	Semitau and Suhaid	18,000	In operation	SINAR MAS

Note:
n/a: information not yet available

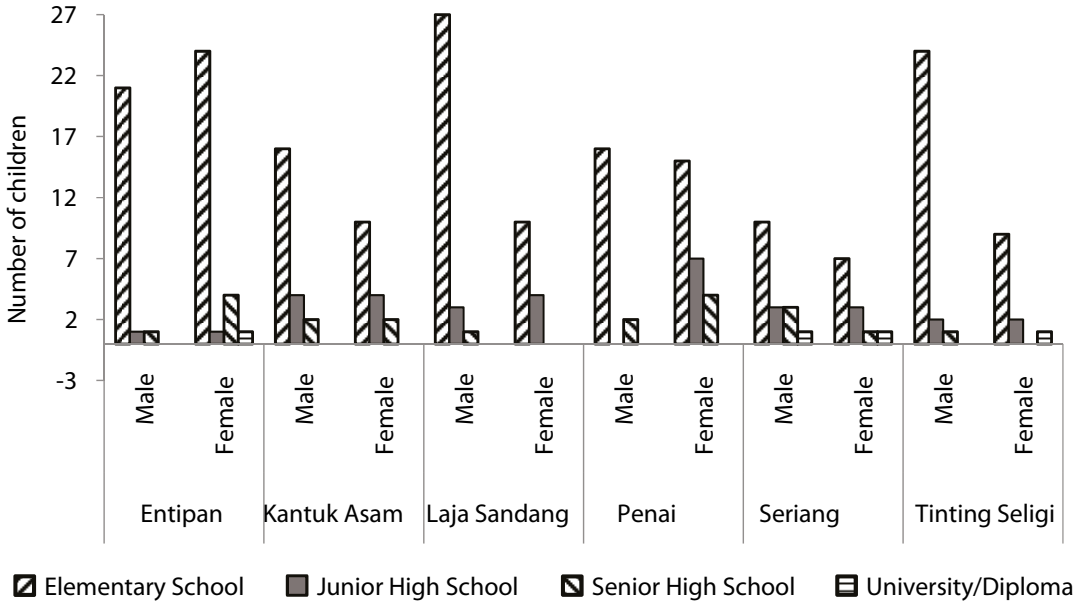

Figure 2. Number of children enrolled in school.

Dayak Sebaru, according to Bamba et al. (2008), live in the area around Silat Hilir sub-district and are similar in terms of language to the Dayak Ketungau of Sintang district.

All villages are traditional villages with the population ranging from 400–1500 inhabitants, where Kantuk Asam is the least populated and Penai is the most populated area. Among the households surveyed, there are relatively equal proportions of males and females. The population at productive age (15–60 years old) is expected to provide the labor for the community and seems to be the dominant age group. The second largest age group is the school age population (5–14 years old), while the younger (0–4 years old) and older (>60 years old) groups vary across villages. In Entipan the population under 5 years old is relatively high, and the highest proportion of the elderly group is found in Seriang.

Education and health infrastructure among the villages in Pilot 4 are relatively poor. The majority have only access to elementary school education with a few having access to junior high school as found in Tinting Seligi, Laja Sandang and Entipan (see Figure 2). For children to attain higher education

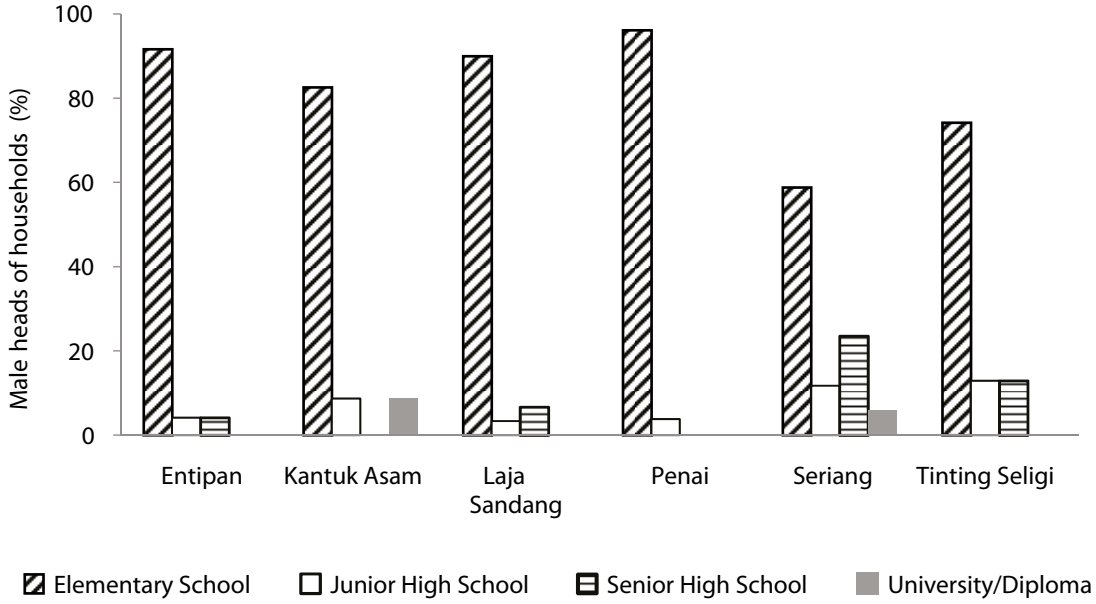

Figure 3. Education attainment of male heads of households.

such as senior high school, they need to go to the sub-district capital. Very few children attend university, as is the case in Entipan, Seriang and Tinting Seligi. In addition, the education level of male heads of households is low (see Figure 3).

The health services in the village are very basic. Most villages have midwives such as in Laja Sandang and Entipan and the community has access to a small medical clinic. In case of emergencies, the patient will be sent to the sub-district hospital in Putussibau.

Various institutions have supported the development of the village infrastructure. PNPM is widespread in Kapuas Hulu and nationally. Such programs help villages to improve their basic infrastructure such as roads, water and electricity services, e.g., in Kantuk Asam, Laja Sandang and Penai. Other funds are also available from the village allocation fund (ADD) and development projects from particular district agencies. The district government allocates ADD to all villages as village funds.

2.2 Land use

Land use in Pilot 4 can be classified into subsistence agriculture, agroforestry and commercial agriculture (Figure 4). The majority of communities in this area practice swidden agriculture mainly for subsistence. Cash income is derived from rubber tapping which is considered agroforestry. In this area, people also grow fruits, vegetables and medicinal plants. At the same time commercial agriculture has been started with the introduction of oil palm.

The district government has allocated several oil palm concessions around Pilot 4, which are at various stages of development. A few of them are still at the preparation stage (nursery and land preparation), others have started the plantation operation, while several others are advancing and are now starting to harvest, this typically takes a period of 4 years (Table 2. Land allocated for oil palm plantation in Pilot 4.Table 2).

The oil palm allocation at the moment has not disturbed agricultural production as communities and individual households are able to use old fallow land. However, this could change in the future as the population grows and the pressure on land increases, with the potential for conflict over land between local communities and oil palm plantations.

Dryland used for agriculture is relatively small. In Entipan and Penai dryland is less than 1 ha/HH and in other villages such as in Laja Sandang and Tinting Seligi the area is slightly larger about 1.3–1.5 ha/HH, with the largest in Seriang at 1.8 ha/HH. In addition, the local community also manages a rice field, i.e., swamp paddy field where they plant paddy, however, this is small compared to the dryland they use due to the land suitability. In general, rubber gardens occupy about 1.5–2.3 ha/HH. In total, rice fields occupy the smallest area less than 5 ha per village, while dryland

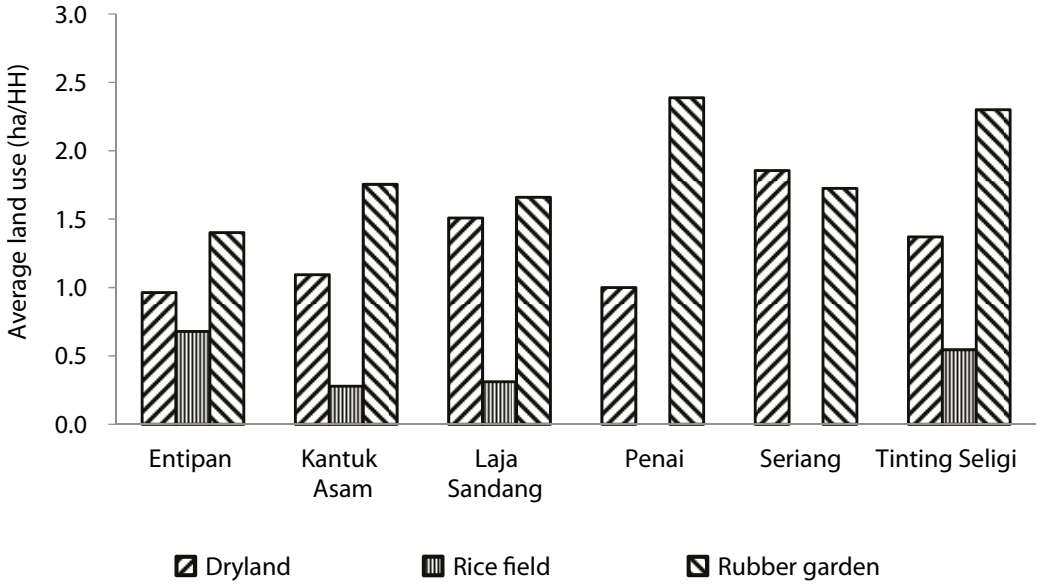

Figure 4. Average Agricultural Land use (ha/HH).

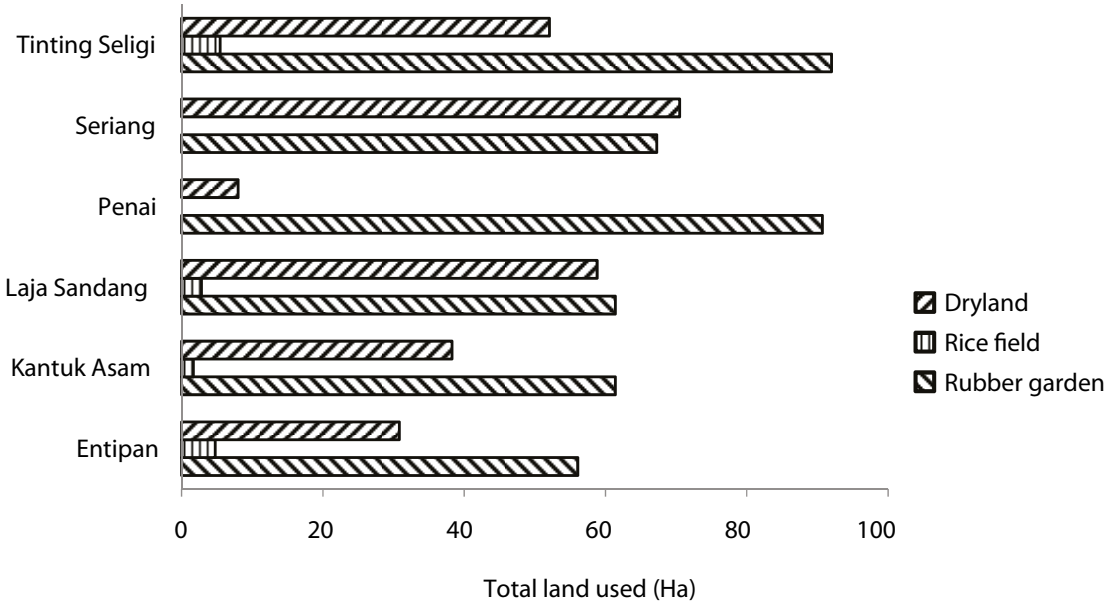

Figure 5. Total land use per village (hectare).

occupies 30 to 70 ha per village and rubber gardens occupy approximately 60 to 90 ha per village (see Figure 5).

Figure 5 clearly shows the relative importance of rubber gardens in Pilot 4, which occupy large and relatively permanent areas. While other types of land use such as dryland (*ladang*) varies among villages. Penai has the smallest area of dryland due to the availability of jobs such as wage labor on oil palm plantations and traditional gold mining in the area. These activities offer more cash income than subsistence agriculture.

2.3 Livelihoods and economic analysis

In general, people in the Pilot 4 area are engaged in multiple livelihood activities for subsistence purposes and to earn cash income. In all villages, rubber is the dominant product produced for cash income followed by NTFPs and timber extraction. Traditional gold mining, such as in Penai and Entipan, is also important, but it depends on the available resources. Non-farming activities are another source of cash income, for example artisan, wage labor and working abroad. For the

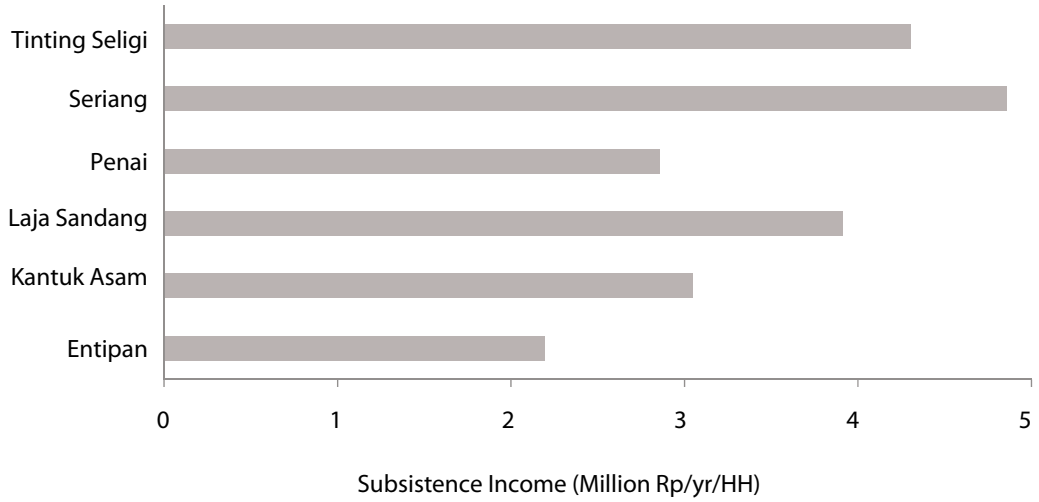

Figure 6. Annual subsistence agriculture (rice only) value (Rp/HH).

Table 3. Annual village rice production and consumption.

Village	Average consumption (kg/HH)	Village rice consumption (kg)	Village rice production (kg)
Entipan	547	21,870	12,606
Kantuk Asam	367	14,670	19,583
Laja Sandang	441	17,640	25,635
Penai	423	16,920	4,050
Seriang	351	14,040	32,830
Tinting Seligi	416	16,650	28,070

Note: average consumption is assumed 0.2 kg/person/day

Iban community, especially men, it is common to work in Malaysia to gain extra cash if their labor is not needed at home (Wadley, 1997)[26]. Oil palm plantations provide new wage labor opportunities for local people for instance in Tinting Seligi, Kantuk Asam and Laja Sandang.

As already described above, dryland agriculture is predominantly used to support subsistence needs. Products grown are mainly rice, maize, tubers, and vegetables. Rice (production) is a staple food that is rarely sold. It is, however, occasionally bought at local markets to supplement the household production and meet food requirements.

Dryland agriculture can only produce rice once a year and its total production in Pilot 4 shows a range of 12 to 33 tons per year (Table 3). In Penai, the production is very small as only a few people engage in dryland agriculture, but local people buy rice from cash earned, among others, from gold mining and oil palm employment. Although the total production varies across villages, the annual consumption is around 360–550 kg/HH.

Since subsistence agriculture is important for providing food security, calculating its value is equally important. To do this, the harvest volume is treated as marketable goods and is multiplied by the price of rice at the local market, i.e., Rp6,000–Rp7,000/kg. The total value represents the money that might be actually spent if the farmer had to buy the rice from the local market (See Figure 6).

In addition, local people generate income from perennial crops, mainly rubber, and in some villages such as Kantuk Asam, Seriang and Tinting Seligi, they also grow pepper. Rubber provides significant annual cash income ranging from Rp8 million to Rp18 million/HH, while pepper generates an income of about Rp4 million–Rp7 million/HH (Figure 7).

26 Circular labor migration and subsistence agriculture: a case of Iban in west Kalimantan Indonesia, PhD Dissertation Arizona State University, Tempe

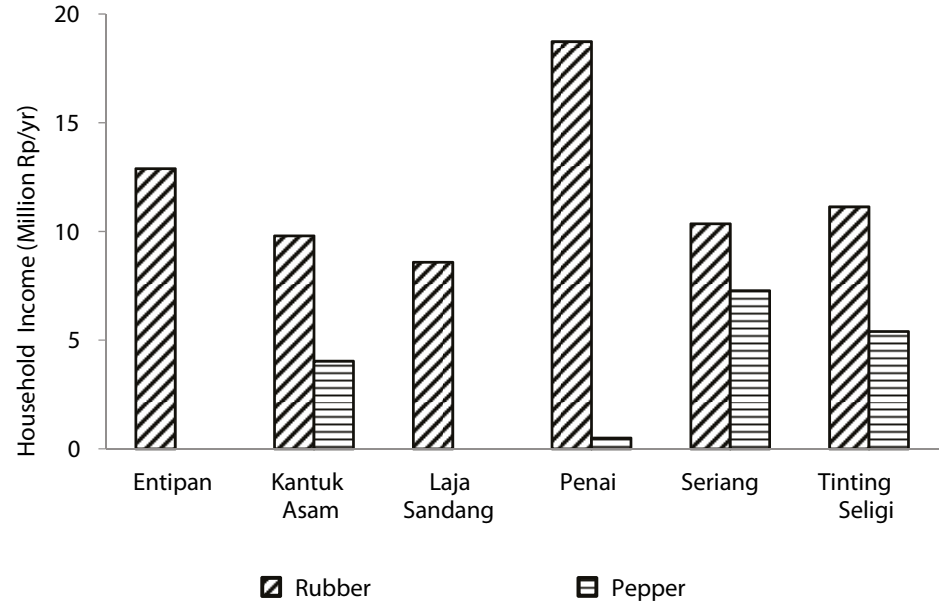

Figure 7. Average income from perennial crops (Rp/HH/year).

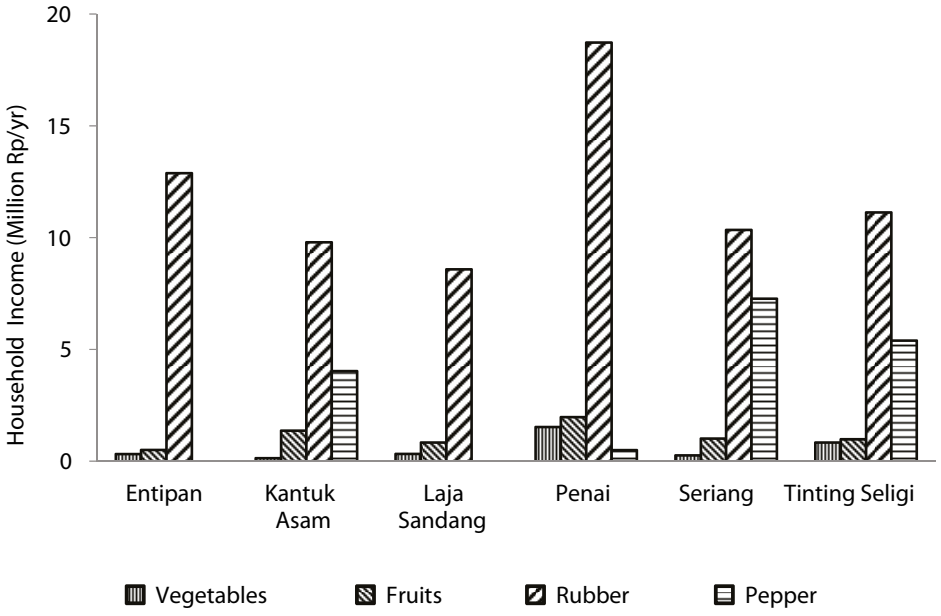

Figure 8. Average cash income from agricultural activities (Rp/HH/year).

Among the cash income generated from agriculture, rubber is still dominant, followed by the income from pepper. The farmers also sell other produce such as chili, spinach, eggplant, etc. Fruit harvested from agroforestry is sometimes sold locally in the market. Income from fresh produce and fruit is relatively small compared to that from rubber and pepper (Figure 8. Average cash income from agricultural activities (Rp/HH/year).Figure 8). In Penai, although dryland is a smaller area than other villages, the produce sales are higher.

Rearing livestock is common for both subsistence and saving purposes. In Pilot 4, almost all households have livestock, except in Penai where only about 25% of the households own livestock. The most commonly reared livestock are pigs, goats and chickens. Livestock is important for family food

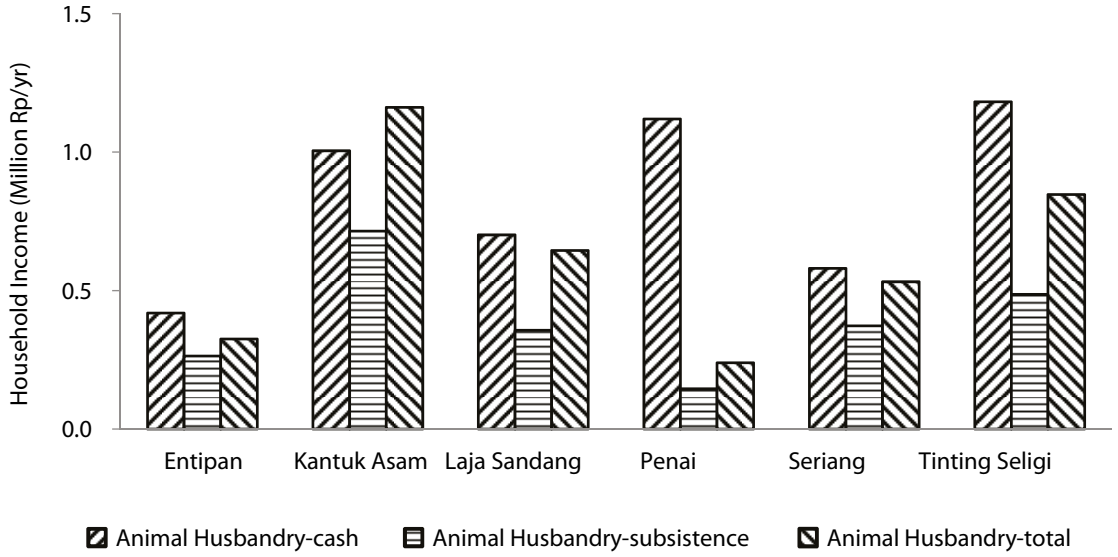

Figure 9. Income from animal husbandry (Rp/HH/year).

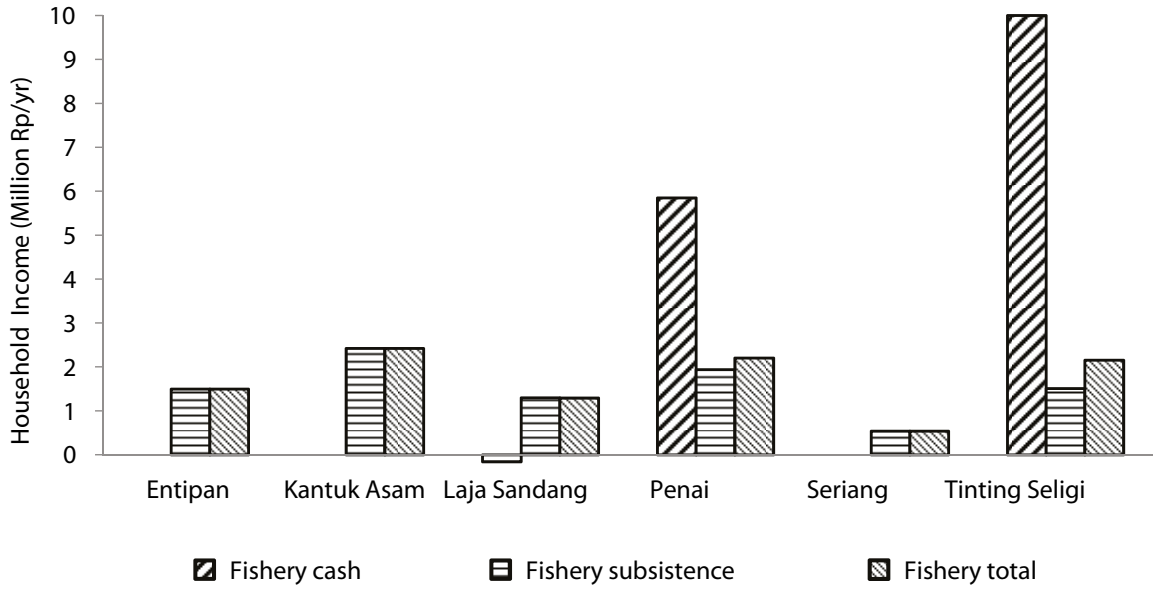

Figure 10. Income from fisheries (fish ponds and river fishing) (Rp/HH/year).

consumption and also as a means of cash income when needed. Cash income generated from livestock is relatively small as only a few households sell their livestock in the local market. Overall, the average, annual cash income from the sale of livestock ranges from Rp420,000 to Rp1,180,000/HH (Figure 9).

Fisheries, fishponds and river fishing, are also important in Pilot 4. Fishponds are usually established near the house and occupy a small amount of land, on average about 0.03 ha/HH. Fishponds are mainly for subsistence, but sometimes households sell the fish in the local market. River fishing is conducted during free time, usually after working on the farm. In all villages, at least 50% of households go river fishing solely for family consumption.

The average cash income generated from the fishponds, as seen in Penai and Tinting Seligi, is between Rp5 million–Rp10 million/HH. Among the seven households that have fishponds, only one household sells the harvest in the market in Penai. Whereas, in Tinting Seligi two out of 12 households sell their fish from their ponds in the market in Laja Sandang. Cash income was negative because the households (at the time of the interview) had not yet harvested the ponds, but were continuing to pay the production costs (fish feed, etc.).

Table 4. Forest products and uses.

Use	Type of product (local name)
Timber	*Belian*, *Entanggur*, *Entemau*, *Jenggir*, *Keladan*, *Kelansau*, *Tengkawang*, *Meranti*, *Mubung*, *Penyatuk*, *Rengas*, *Resak*, *Tekam*, *Temerawan*
Game	Wild boar, *bekantan*, mousedeer, deer, monkey
Weaving materials	*Bemban*, *Daun kerupuk*, *Gernis*, *Kulan*, *Pandan*, *Senggang*
Vegetables	Sagoo leaves, *Daun Sebabal*, Mushroom, Fern, Bamboo shoot, *Daun Sabung*, Rattan shoot
Raw materials	Rattan, *Tengkawang*, Bamboo

Table 5. Economic value of raw NTFPs (HH/year).

	Rattan		*Tengkawang*		Bamboo	
	N	Mean (Rp,000)	N	Mean (Rp,000)	N	Mean (Rp,000)
Entipan	25	-	5	762	10	-
Kantuk Asam	18	-	4	604	14	-
Laja Sandang	25	-	8	1,078	18	-
Penai	6	-	1	2,500	4	-
Seriang	13	-	3	1,250	3	-
Tinting Seligi	30	-	3	523	22	-

Subsistence fishing is important in some villages such as Entipan, Kantuk Asam, Seriang and Laja Sandang. In terms of income, subsistence fishing can be estimated to be worth between Rp500,000 and Rp2.4 million/HH/year. In total, income from fisheries can be seen in Figure 10.

Forest resources are still important for people in Pilot 4. A range of products for different uses is collected as summarized in Table 4.

Tengkawang (*illepa* nut; *Shorea* spp.) is an important source of cash income, but harvest normally takes place every 3 years. Harvest volumes vary across villages. *Tengkawang* often grows naturally and is commonly found along riverbanks. From *Tengkawang*, oil can be extracted and processed for use in cosmetic products among others. *Tengkawang* is usually sold unprocessed at about Rp5,000/kg in the local market. On average, *tengkawang* contributes around Rp500,000–Rp2.5 million/HH to the household's cash income (Table 5).

There is often a gender split in the collection of forest products. For example, timber and animals are collected or hunted predominantly by men, while women usually collect weaving materials and vegetables and the whole family are involved in collecting *Tengkawang*.

Women are mostly responsible for cleaning rattan and collecting other weaving materials such as bemban, kerupuk and senggang. The Iban community is famous for their bemban mats (Figure 11).

Vegetables collected from the forest are also important for the people in Pilot 4 (Table 6). Wild vegetables are collected mostly for domestic consumption although a few people sell them in the local market. For instance mushrooms are sold in Seriang and Tinting Seligi. Bamboo and rattan shoots are also important in Entipan and Seriang and can generate an income of up to Rp1 million/HH annually as seen in Tinting Seligi.

Timber remains the main forest product in terms of cash income, although the number of collectors is, as expected, less than for NTFPs. Timber income ranges from Rp900,000 to Rp4.1 million/HH annually and represents an important source of income for villages like Tinting Seligi, Laja Sandang, Entipan and Kantuk Asam.

The income from forest products will always be undervalued since most have little or no market value. Timber, in fact, generates cash income as seen in almost all villages in Pilot 4 while timber use for subsistence represented a comparable value (Figure 12). Figure 13 shows that NTFP benefits for subsistence outweigh their cash value. Total income shows an average income for both cash and

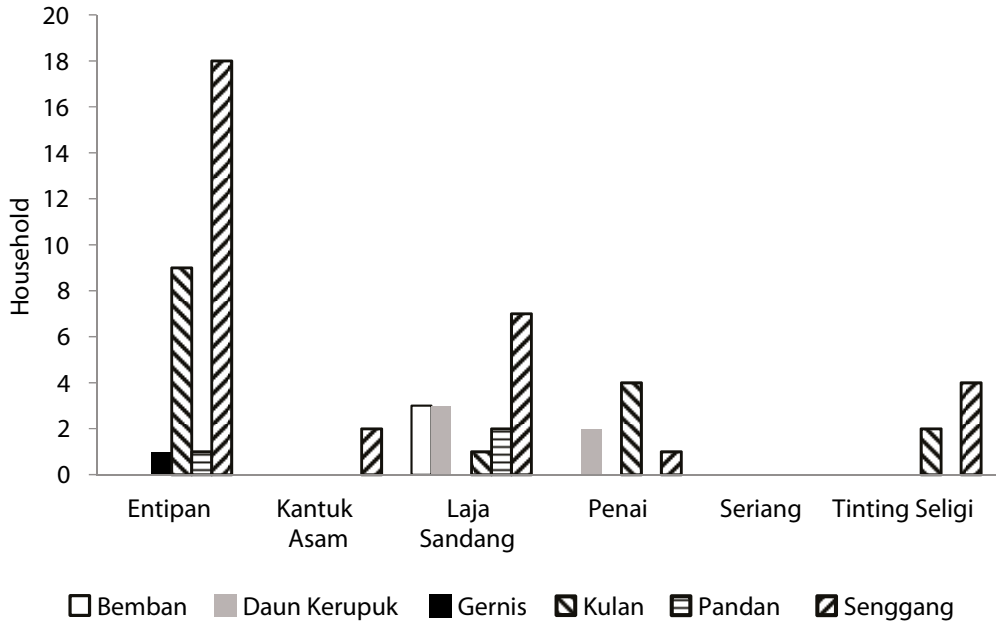

Figure 11. Number of HH who collect NTFPs for weaving mats.

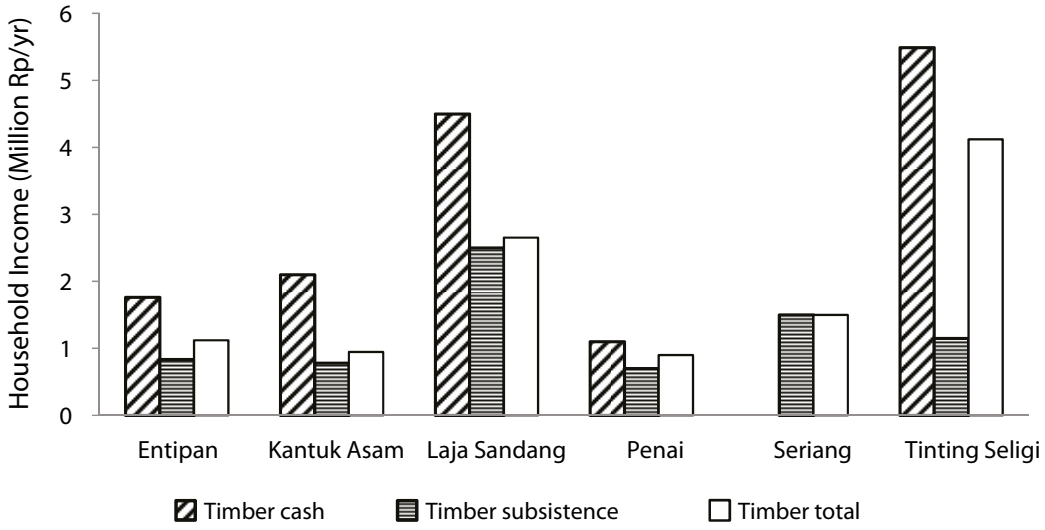

Figure 12. Total income generated from timber (Rp/HH/year).

Table 6. Average income generated from wild vegetables (Rp/HH/year ×1,000).

NTFPs / Village	Sago leaves		Mushrooms		Ferns		Bamboo shoots		Rattan shoots	
	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean
Entipan	-	-	-	-	-	-	1	-	1	125
Kantuk Asam	-	-	-	-	3	-	2	-	-	-
Laja Sandang	-	-	-	-	2	-	-	-	-	-
Penai	1	-	-	-	7	-	7	-	-	-
Seriang	-	-	1	432	3	-	2	216	-	-
Tinting Seligi	-	-	4	632	7	587	4	1,071	-	-

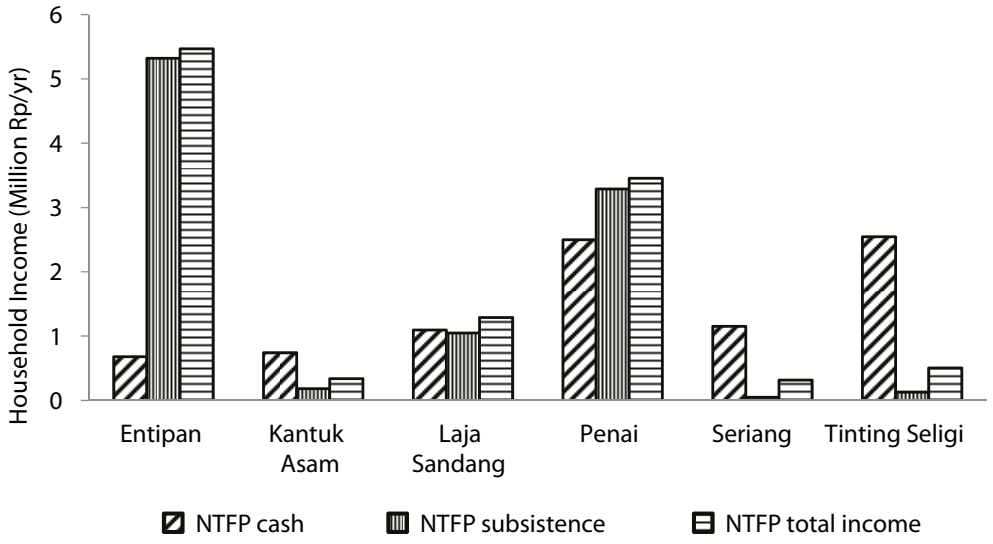

Figure 13. Total income generated from NTFPs (Rp/HH/year).

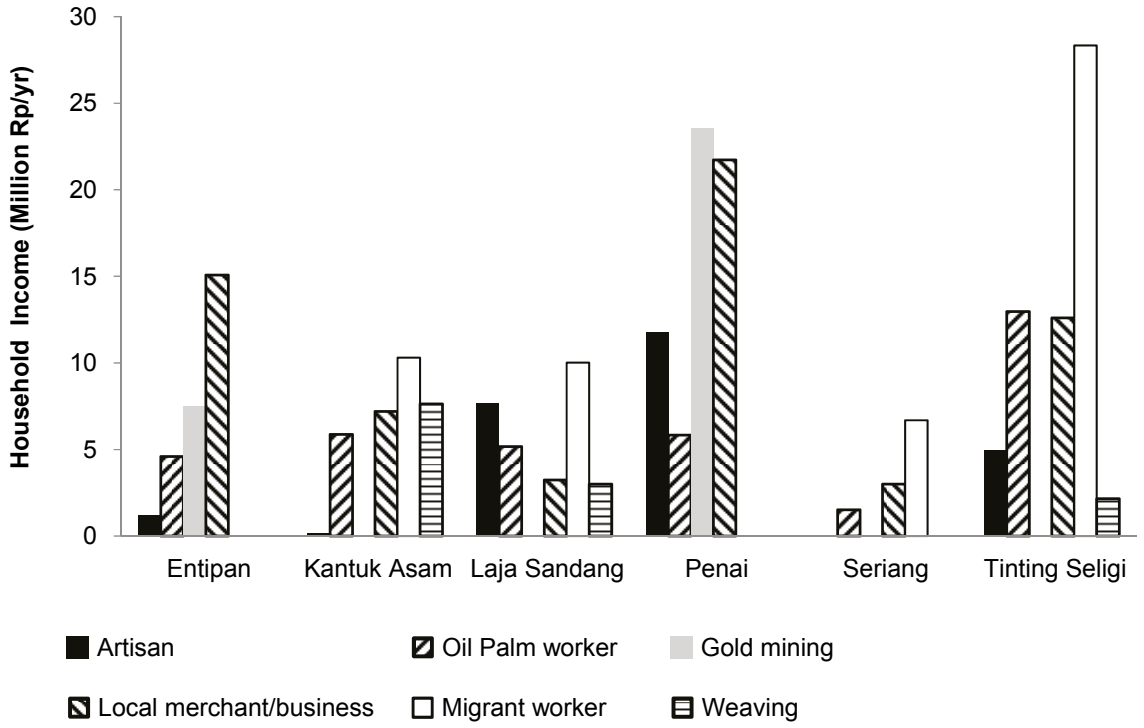

Figure 14. Average cash income from non-farming activities (Rp/HH/year).

subsistence income. This ranges from Rp300,000 to Rp5 million per HH/year.

Farmers in Pilot 4 do not rely only on a single livelihood source such as rubber or farming. They undertake multiple activities to reduce the risk of adverse impacts on their income over the short and longer term. Other activities, for instance, wage labor and working abroad are sources of cash, which outweigh regular income from agriculture including that from the forest (Figure 14).

In general craftsmen include, for example, blacksmiths, masons and builders. These are important sources of income for people in Laja Sandang and Penai. Women in Kantuk Asam and Tinting Seligi are familiar with *ikat* weaving techniques and produce items such as scarfs, vests etc., for trade in Sarawak.

In this area there is a trans-border economy with remittance payments playing an important role.

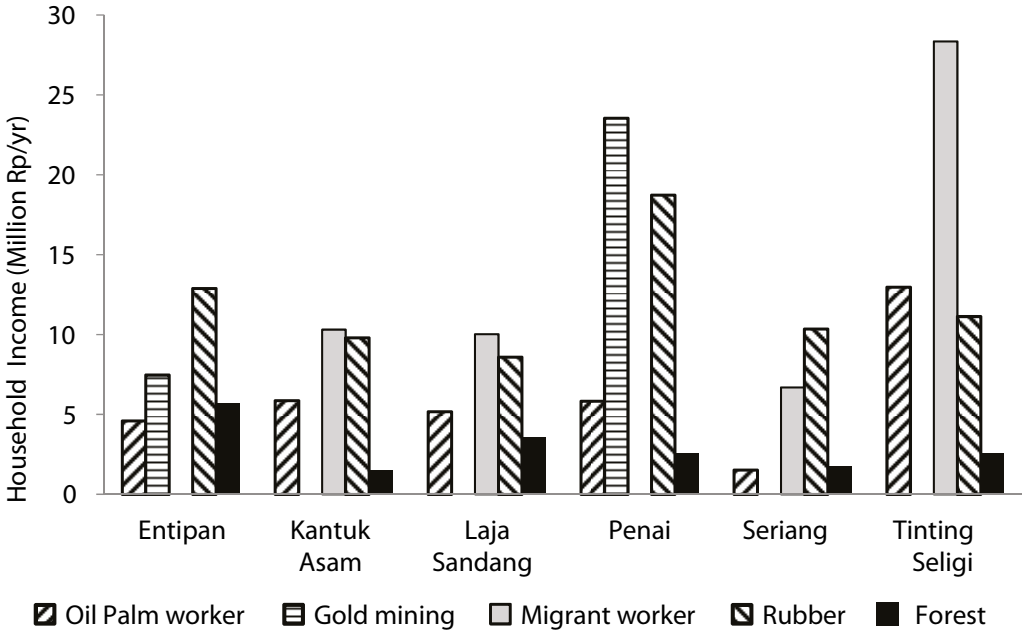

Figure 15. Income comparison by activities (Rp/HH/year).

There is a culture among the communities along the Indonesia – Malaysia border, for the Iban to work abroad (Sarawak, Brunai) in order to earn cash as well as gain experience. Males, many 20–40 year olds, work as wage labor in construction, plantations, etc., in Malaysia after the planting season, and then return to the village for the harvest season. This activity often provides a substantial contribution to the household income in Kantuk Asam, Laja Sandang and Seriang.

The local merchants and business people are growing in importance in Pilot 4. It requires skill as well as capital to establish and run a business. Such businesses include trade in groceries and buying and selling local produce such as latex, *tengkawang*, etc. Merchants can make a profitable business as many villages are located in remote areas and are thus highly dependent on merchants for access to local markets. The merchants' income ranges from Rp3 million to Rp21 million/HH annually.

Similar to the other pilot areas gold resources are found in Entipan and Penai. The miners use a special machine to suck up the river sediment and then deposit the gravel onto a carpet on the mining platform in order to separate out the gold particles for further processing. This activity is generally considered small-scale mining and often lacks a legal permit from the local government. In Penai, the average annual income is about Rp7 million/HH and in Penai about Rp23 million/HH. This represents about 20–35% of the non-farming income.

Several oil palm plantations have started operations in this pilot area. Employment opportunities with these plantations are growing. For example, wage labor for temporary day jobs, such as preparing the seedlings and also for more permanent jobs such as drivers, field supervisors, etc. Plantations require a lot of laborers who come from nearby and neighboring villages. For a daily laborer, the company pays Rp39,000/day paid every fortnight. Overall, the lowest income work on oil palm plantations is in Seriang, which is about Rp1.5 million/HH and the highest is in Tinting Seligi, which is about Rp13 million/HH.

In summary, rubber is still an important source of income in all villages in Pilot 4. The growth of non-farm income such as wage labor on oil palm plantations is increasingly common in Pilot 4 although the extent varies between villages. Tinting Seligi, which is closer to the oil palm site has the highest income from oil palm activities compared to other villages. In addition, gold mining is important in two villages namely in Entipan and Penai. Cash contributions or remittance from family members in Malaysia, in three villages: Kantuk Asam, Laja Sandang and Seriang, is almost as important as income from rubber (Figure 15).

Table 7. Total amount of compensation villagers have received from oil palm concessions for land used (Rp).

Village	Oil Palm Land Compensation	
	Mean	Valid N
Entipan	-	-
Kantuk Asam	4,413,750	24
Laja Sandang	2,843,750	8
Penai	-	-
Tinting Seligi	4,589,000	25
Total	4,248,362	58

In addition to income from employment, in areas where there are oil palm plantations, villagers reported receiving compensation for their land used and occupied by the company (Table 7). A baseline rate used by oil palm companies is Rp250,000/ha for land compensation. This is a one-off payment for each hectare of land. However, only three villages reported receiving such a payment, i.e., Kantuk Asam (24 beneficiaries), Laja Sandang (8 beneficiaries) and Tinting Seligi (25 beneficiaries). On average, people receive compensation in total of about Rp4.5 million/HH in Kantuk Asam and Tinting Seligi, and Rp2.8 million/HH in Laja Sandang.

The oil palm compensation value is very low in terms of value of alternative uses. Assuming the oil palm concession is for about 25 years, the yearly compensation value would be equal to Rp10,000/ha/year. This is very low compared to alternative use of land. For example, if the land was planted with rubber, the community could earn, solely from rubber tapping, more than Rp10,000/ha per day[27].

Rural livelihoods are dynamic and face various risks that make them vulnerable. Villagers' livelihoods become vulnerable if they lack capacity to cope with factors threatening their livelihoods[28]. In many cases the more options local people have the better they are able to cope with disasters. Unfortunately, in rural areas options are often limited.

In the case of Kapuas Hulu, a house fire would be a significant shock and it might take a while for the people to recover lost assets while at the same time having to manage their livelihoods. In Pilot 4, two respondents in Kantuk Asam reported having lost their homes to fire. Others mentioned natural disasters such as flooding, crop failure and pests. Sometimes the villagers suffer more than one disaster and it needs an integrated approach in order to help them to better cope (Table 8).

Various responses to disasters are also recorded and include, among others, in response to crop failure people might find wage labor to get cash or borrow cash from relatives. In coping with pests some said they buy insecticides to get rid of the pest, but others also said they might do nothing. This can be due to a lack of knowledge and limited access to high quality agricultural products or cash with which to buy such products.

2.4 Household assets

Asset ownership can be a way for people to cope with various risks. When people fall ill and do not have cash, one option is to sell an asset to pay for treatment. In all villages, generator and cellular phone ownership are essential to cope with a lack of infrastructure (electricity and telecommunications). About 15–50% of households own generators and almost all own mobile phones (40-90%). Chainsaws and rifles are also important capital for extracting forest resources, except in Penai its share is less than 3% of households (Table 9).

Transport is essential to support local people's mobility. In Pilot 4, it is common for local people to own a motorcycle except in Entipan, Penai and Tinting Seligi where the community own both road transport and river transport (Figure 16). Eight households owned cars in Tinting Seligi, taking advantage of good road access to the close-by Badau sub-district.

3. Critical issues

3.1 Oil Palm plantations: benefits and consequences

In Pilot 4, oil palm plantations do provide direct economic opportunities in terms of jobs and income. However, questions remain as to the potential environmental impacts. Currently, there is ongoing speculation that oil palm plantations may increase sedimentation in local rivers. Villagers in Entipan reported that before oil palm plantations were established upstream of their village, the water quality was relatively good, but now they are experiencing river sedimentation. Although it is not clear whether

27 Assuming latex production is per day around 2 kg/ha, which in actual fact might be larger.

28 http://www.poverty-wellbeing.net/media/sla/docs/1-5.htm

Table 8. Perception of vulnerability.

Village	Financial loss (case reported)	Risk identification			
		House fire	Natural disaster	Crop failure	Not stated
Entipan	12	-	11	11	1
Kantuk Asam	12	2	9	4	3
Laja Sandang	5	-	5	4	-
Penai	34	-	11	2	23
Seriang	5	-	5	5	-
Tinting Seligi	3	-	3	1	-

Table 9. Percentage of asset ownership and its value (Million Rp).

Assets / Village	Generator		Chainsaw		Ancient Jar		Riffle		Mobile phone	
	%	Sum Rp	%	Sum Rp	%	Sum Rp	%	Sum Rp	%	Sum Rp
Entipan	38	25.5	33	26.6	8	0.9	43	8.1	45	9.9
Kantuk Asam	55	58.4	33	34.1	58	29.2	50	14	50	15
Laja Sandang	33	36.2	28	42	33	14.9	68	16.8	65	13.9
Penai	33	26.3	13	19	8	0.9	3	0.5	83	37.8
Seriang	15	19.7	38	53	60	32.7	73	22	95	41
Tinting Seligi	43	50.4	53	87	53	25	70	31	85	28.3

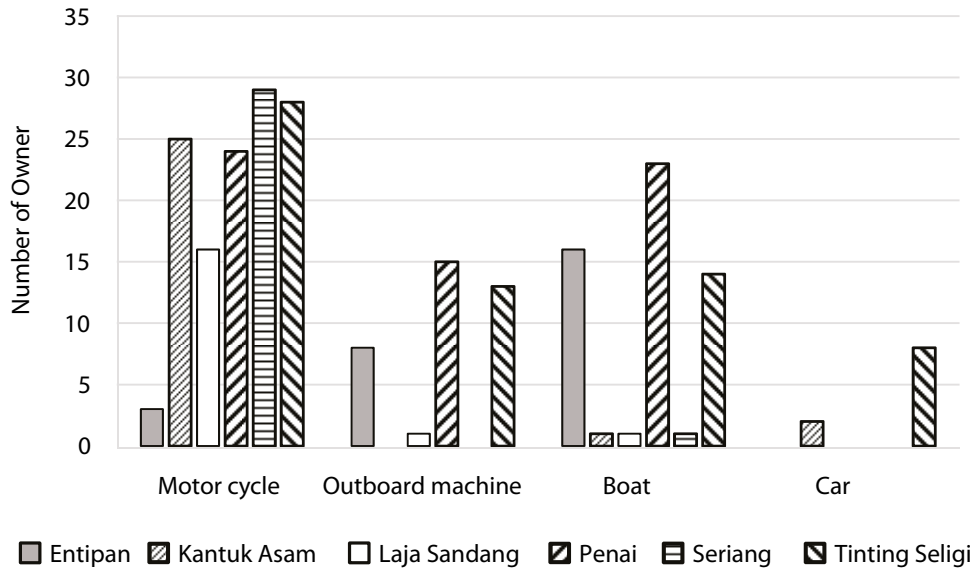

Figure 16. Number of people who own transport in Pilot 4 villages.

the sedimentation has resulted from the oil palm or gold mining activities conducted upstream by the Entipan people. Therefore, further research is required to clarify the severity of environmental impacts of oil palm plantations.

In terms of land-use issues, the land that people give over to the company will not be accessible for at least 25 years. The current land use may be sufficient for the current generation, however, as the population

grows, the land will not be sufficient for their children and grandchildren.

3.2 Institutional arrangements for community gold mining

Local people have undertaken gold mining for several years in Entipan and Penai and it contributes significantly to villagers' livelihoods. Since the community operates small-scale mining, they do not have formal mining permits except a local agreement between miners and the landowner. Applying for a permit for small-scale mining is costly and the community cannot afford it. On the other hand, the district authorities consider community gold mining, without a permit, illegal. The miners are insecure not only in terms of business legality, but also from extortion. During the survey the researcher witnessed soldiers on river patrols extorting money from the miners.

The government and community need to work together to find alternative incomes suitable for the people living in this area and the area itself. Realizing the environmental impact of the mining for the miners and communities downstream, the government needs to take in to consideration measures to change livelihoods that can be established without creating social discontent.

3.3 Livelihoods and economic opportunities

People's livelihoods are still dependent on natural resources such as farming, gathering NTFPs and fishing. However, cash income generated from these activities is often not sufficient and alternative livelihoods are also limited. In the past, logging was an important source of cash, but now the government has banned it. Therefore people are looking for other livelihoods especially wage labor within the area or abroad (Sarawak, Malaysia). In the past a lack of jobs in the area forced people to work in Sarawak although domestic wage labor opportunities are increasingly available with the expanding oil palm plantations.

The border between Indonesia (Badau) and Malaysia opened on October 2012. This will have socio-economic implications related to land and people's livelihoods such as greater mobility, growing opportunities in terms of jobs, access to markets including the land market, as well as cultural change.

It is evident that a cash economy has developed in the area, but the question of the importance of land for the community is still worth asking. The reality is that land as the main capital asset in rural areas is now threatened by alternative uses especially from large estates such as oil palm. To answer this question and provide information for policy makers to improve interventions to gain greater welfare for the local people, understanding the cause of land-use change is a must.

***CIFOR Working Papers* contain preliminary or advance research results on tropical forest issues that need to be published in a timely manner to inform and promote discussion. This content has been internally reviewed but has not undergone external peer review.**

Understanding the socio-economic conditions, the drivers for land use change and economic development, along with cultural and social characteristics, is essential to ensure that land use decisions are made that ensure positive economic and social outcomes are optimised.

The CoLUPSIA socio-economic team researched the conditions facing communities and individual households across four pilot areas, each area representing different socio-economic and environmental/ bio-physical conditions. Household, village, key interview surveys and focus group discussions, were completed for 876 households, 22 villages, equivalent to approximately 7.2% of the total number of households and 10% of villages in Kapuas Hulu Regency, West Kalimantan.

The results highlight the challenges that face the communities and how these vary across the pilot sites. For example in Pilot 1 is located within the boundaries of two national parks, land is more restricted as communities face unclear boundaries, and Pilot 2 located to the east of Putussibau, the villagers are heavily dependent on natural resources, with relatively limited economic opportunities but gold mining which has environmental consequence and face a legality issues. In Pilot 3 and 4, exhibit case of communities are more dependent on diverse source of livelihoods such as rubber production, gold mining and paid employment. Oil palm plantations increasingly become an alternative employment as well as has potential negative impact to environment.

The results of the socio-economic survey aim to provide a baseline that provides an understanding of the relationship between the communities in Kapuas Hulu regency and the natural resources – use and non-use, coupled with the needs for economic development. The resulting challenges and opportunities are identified and can be used in the development of land use planning processes and where possibly in the development of Payment for Ecosystem Service (PES) schemes.

This research was carried out as part of the European Union funded Collaborative Land Use Planning and Sustainable Institutional Arrangement project (CoLUPSIA). Run by CIRAD in partnership with CIFOR, TELAPAK and several local NGOs and Universities, the project aims to contribute to avoided environmental degradation and to strengthen land tenure and community right by collaboratively integrating all stakeholders' views in land use planning processes. The outputs revolve around the relationship between land use planning, land allocation and the provision and potential payment of ecosystem services. The project focuses on two regencies (kabupaten), Kapuas Hulu and Central Maluku in Indonesia.