Prosperity in the Palm:

A Case Study of Small-Scale Oil Palm and Livelihoods in Menangkin, Sarawak

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ILUNRM REPORT

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Photo by Dennis Johnsen, 2018

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Abstract

Small-scale oil palm (SSOP) in Sarawak has emerged in the wake of dramatic plantation expansion, with independent smallholders finding profit in the industry despite government favouring of private, joint-venture schemes. Based on a case study of an Iban village in Sarawak, this report assesses rural livelihoods in the context of increasing SSOP cultivation, examining trends of diversification or specialisation of livelihood portfolios as a result of increased income-generating capacity. To see how SSOP affects livelihood diversification at the household level, the determinants for growing SSOP are investigated. It was found that SSOP is adopted by villagers as a long-term strategy which can reduce household vulnerability through providing high and stable income. Overall, the oil palm industry has brought prosperity to Menangkin in the form of a variety of income opportunities. However, due to high start-up costs, independent cultivation of SSOP is only feasible for households with sufficient pre-existing capital. Households with and without SSOP alike maintain diverse livelihood portfolios, indicating that despite its lucrative prospects, SSOP cultivation does not encourage livelihood specialisation. However, future growth of SSOP in Menangkin could cause greater homogeneity on a landscape level, as more fallow cropland is converted to oil palm fields.

Keywords: small-scale, oil palm, diversification, specialisation, livelihoods, vulnerability

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List of abbreviations

FFB	Fresh Fruit Bunch (palm oil)
FGD	Focus Group Discussion
HH	Household
JVC	Joint Venture Company
JVS	Joint Venture Scheme
MPOB	Malaysian Palm Oil Board
NTFP	Non-Timber Forest Product
OP	Oil Palm (crop)
PO	Palm Oil (processed product)
PRA	Participatory Rural Appraisal
QUE	Questionnaire
SSI	Semi-Structured Interview
SSOP	Small Scale Oil Palm
SOM	Soil Organic Matter
SF	Secondary Forest
USI	Unstructured Interview

1.0 Introduction

Over the last century, rural livelihoods and land use in Sarawak, Malaysia have undergone a series of politically-charged transitions with significant social, economic, and ecological consequences for rural inhabitants. Such development followed the escalation of government-sponsored, large-scale land acquisitions for agricultural commodity production. Sharp price increases in the global market for cash crops such as rubber, pepper, and eventually oil palm (OP) facilitated the rapid expansion of large-scale plantations. In recent decades, the Sarawak government has pursued development policies that favour private estate expansion over smallholder production, looking to consolidate the latter into joint-venture schemes (JVS) (Cramb and Sujang, 2013). These government-sponsored activities were conducted under the guise of rural development, with the goal of rapidly transforming native territories into "productive" agricultural landscapes (Wilms-Posen et al., 2014). These economic trends, coupled with increasing urbanisation, commercial logging, and wage-labour markets, brought dramatic changes in Sarawak land use (Mertz et al., 2013).

Yet despite political favouring of plantation agriculture, Sarawak has seen an upsurge in small-scale cultivation of export commodities (Cramb and Sujang, 2013). Small-scale cultivators in this report will be defined as individual participants in cash-crop markets, independent of corporate or government land development schemes. Before the period of British colonisation that began in the early 19th century, indigenous Iban people used primary forest for swidden cultivation. Increasing forest development throughout the British occupation saw both greater exploitation of natural resource capital and land-intensive cash cropping by smallholder farmers (Wadley et al., 2005). Although rubber was introduced in the early 20th century as a valuable market product, cash-cropping did not really "take off" until the later decades of the 20th century with the introduction of pepper and OP (Wilms-Posen, 2014).

Indeed, small-scale oil palm (SSOP) cultivation in Sarawak has spread widely in the 21st century, from about 9,000 ha in 2001 to 96,000 ha in 2009 at an average annual growth rate of about 36% (Cramb and Sujang, 2013). Today, OP continues to emerge as a viable income opportunity for rural communities. A wealth of recent research addresses SSOP in Sarawak in the context of government development schemes, agricultural commodity chains, land use diversity, sustainability, and issues with native land tenure (Cramb et al., 2013; Cramb et al., 2016; Nelson et al., 2016; Hamilton-Hart, 2017). However, the determinants of investing in SSOP for individual households, which are independent of development schemes such as SALCRA or JVC, has yet to be thoroughly investigated. Some studies explore the institutional challenges faced by these independent SSOP cultivators, yet these texts do not examine the effect of such challenges in the broader context of the household's livelihood framework (Martin et al. 2013; Nagiah and Azmi,

2012; Cramb and Sujang, 2013).

According to Ellis (2000), rural households continuously adapt to changing economic climates by adopting a highly diverse portfolio of activities to help secure livelihoods. However, factors that increase returns to time spent on farm activities tend to reduce household motives to diversify. Such factors include increased or stable farm output prices and higher yielding crop varieties (Ellis, 2000). In the village of Menangkin, OP has gained prominence as a high-yielding cash crop with a relatively high market price; over half of the village households have begun SSOP in the last decade. While the opportunity to engage in such a high-return income activity could positively impact village livelihoods, the potential of SSOP to motivate households to specialise their livelihood portfolio (reducing their amount of income-generating activities) may in fact increase livelihood vulnerability in the future. It is therefore key to analyse the current impact of SSOP on village livelihoods in order to understand the implications for future livelihood security.

This report details our findings from 12 days of field research in the village. During this period, we have observed how, through SSOP, village households have increased the return to time spent on farm activities. However, the adoption of SSOP as a lucrative income-generating activity does not necessarily imply that households are specialising their livelihood portfolios. We investigate how SSOP affects livelihood diversification at the household level by examining the determinants of growing SSOP in Menangkin. To assess village livelihoods and investigate the motivations and constraints of SSOP cultivation, a variety of qualitative and quantitative methods were applied.

1.1 Objective and Research Questions

Given the aforementioned conditions influencing the rise of small-scale oil palm in Sarawak despite prevalent institutional and economic barriers, it is of interest and thus the objective of this study to investigate the determinants of cultivating (or not cultivating) small-scale oil palm in Menangkin and if/how specialisation in oil palm activities influences household incentives to diversify their livelihoods.

We hypothesise that the cultivation of SSOP in Menangkin reduces household incentives to diversify their livelihood strategies in terms of both crops and income activities.

Principle Research Question:

How do villagers of Menangkin adapt to rapid changes experienced in relation to the emergence of small-scale oil palm in the area?

Research Questions:

Assessing Livelihoods

1.1 What are the land use patterns in Menangkin?
1.2 What are the roles of off-farm activities in village livelihoods?
1.3 How is labour prioritised and allocated between different activities?

Identifying Determinants for Cultivating SSOP

2.1 How have changes in market prices over time affected agricultural practices in the village?

2.1.1 How have the agricultural output markets changed in the last decade?

2.2 How does reliance on road networks, transport and seasonal road conditions influence the cultivation of various crops?

2.2.1 How does market access influence the cultivation of oil palm?

2.3 How does SSOP influence villager livelihood strategies compared to other OP-related activities?

2.3.1. How are OP-related activities influenced by institutions and organisations?

2.4 What does soil quality say about the viability of SSOP as a long-term perspective livelihood strategy?

2.4.1 How does conventional cultivation of OP affect soil nutrient status over time?

Text Box 1: Changes from synopsis

Upon arriving at the village and making some initial observations, we made some significant edits to our original research synopsis. These changes can be characterised as a narrowing in focus; due to the prominence of SSOP in Menangkin, we decided that instead of examining the role of agriculture in the village, we would look at livelihood diversification through the lens of SSOP cultivation.

2.0 Theoretical Frameworks

The sustainable livelihood framework by DFID (1999), Ellis (2000) and Scoones (2009) is used in this report to structure the results obtained from field research in the context of village livelihoods, linking relevant contexts with resources, strategies and outcomes. Using this framework to analyse SSOP cultivation, we analyse household assets for SSOP, the institutions and organisations that mediate accessibility to these assets, and how SSOP is incorporated into livelihood strategies.

According to Dietz et al. (1992) livelihood strategies are driven by factors arranged along two axes; one axis of preserving goals in one end and improving goals in the other; the other axis presenting a short-term or long-term perspective. According to these, four livelihood strategies arise (Figure 1). In a preserving and short-term perspective, ***recovery strategies*** aim at recovering and adapt to sudden changes, and in preserving but long-term perspective, ***conservation strategies*** intend to prevent threats and stress to maintain the room of manoeuvre for the household. For improving goals in a short-term perspective, ***opportunistic strategies*** characterises situations when households seize sudden, non-permanent opportunities. ***Structural improvement strategies*** arise in a long-term and improving goal perspective through resource accumulation and improvement of social networks. These strategies are not mutually exclusive; thus one activity can have different goals in different time perspectives (Mertz et al., 1999).

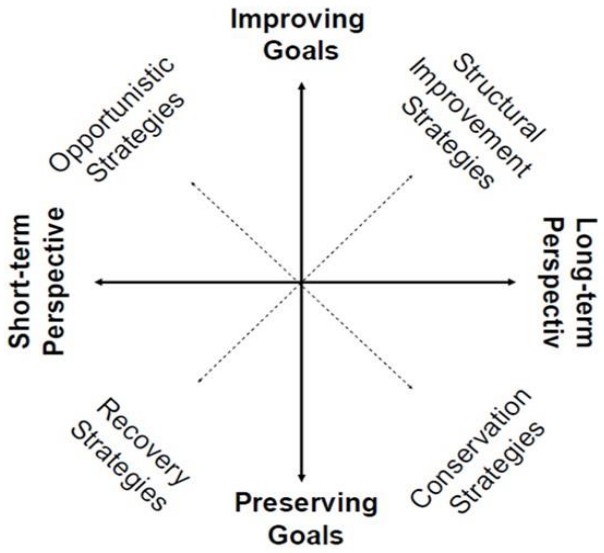

Figure 1: Livelihood strategy classifications, modified after Dietz et al. (1992).

3.0 Methodology

The data obtained was triangulated across both natural- and social science methods to ensure the most valid and representative data. This section discusses the different fieldwork methods applied, including purpose, execution, and challenges with obtaining the desired data (See appendix II for all methods used).

3.1 Questionnaires

A common questionnaire was developed to gather detailed information at the household level. Due to the small size of the village one questionnaire was conducted by one representative from every available household. A trial questionnaire was conducted

with one villager, where all researchers participated to agree on common understanding of questions and necessary modifications before the final survey was administered to the village. After refining questions, researchers split into groups; each group had one interviewer, someone to record answers, and a note-taker for in depth answers and extra information. Notes could be analysed in the same way as SSI data. Due to vacancies and seasonal migration, 21 out of 31 total households were present to be included in the survey[1]. The data obtained gave us a better idea of household activities, an overview of village practices, ideas on who to select as key informants, and later, quantitative information for statistical analysis.

3.2 Semi-structured interviews

With SSIs, we gathered information about cash crops in Menangkin, the effects of the rainy season on production and sale of crops, history and impacts of cash crops on livelihoods in the village, among other areas of interest. SSI was the last social science method we conducted in order to fill knowledge gaps, understand better ambiguous processes (such as OP sales channels) and triangulate obtained data. Key informants for SSIs were selected based on specific knowledge and experience they have on relevant topics (Table 1).

Table 1: Key informants for SSI

Informant	Reason for Selection
Key informant 1: HH09	One of the oldest villagers, with extensive knowledge about the village history, including the establishment of the village, history of cash crops, the influence of individual crops on village livelihoods and dynamics, etc.
Key informant 2: HH32	Village headman and one of the first villagers who started to cultivate OP and one of the most experienced villagers in OP cultivation.
Key informant 3: HH01	One of the first villagers who started to cultivate OP and one of the most experienced villagers in OP cultivation.
Key informant 4: HH18	One of the biggest producers of pepper, rubber and OP in the village.
Key informant 5: HH17	Just started cultivating OP and one of the biggest pepper producers in the village

3.3 Focus Group Discussions

In order to investigate how livelihood strategies differed between villagers involved and not involved in SSOP, two focus group discussions (FGDs) were conducted, one for SSOP

[1]From the PRA mapping 32 households had been mapped, but when encountering the village, only 31 houses were present. Therefore, one household in this project is marked as household 32, even though only 31 households existed.

cultivators, and one for non-SSOP cultivators. The aim of the FGDs was to explore perceptions and determinants amongst villagers to start SSOP cultivation, and compare the difference between the two groups. As only four households did not cultivate SSOP, a limited number of participants were available for the non-SSOP FGD, resulting in a group of only three people representing two households, whereas 9 people, representing 8 households, participated in the SSOP FGD.

For the SSOP group, the focus was to discuss motivations for starting SSOP, positive contributions to livelihoods, barriers to investment, and market influence. For the non-SSOP group, the focus was constraints to joining SSOP, livelihood strategies, perceptions on road access and JVCs. Data was obtained on both personal and group based perceptions of growing or not growing SSOP, allowing for comparison between groups.

3.4 PRA - mapping, ranking and seasonal calendar

Participatory Rural Appraisal (PRA) is a research toolbox containing different participatory, qualitative methods. The following methods were used:

Village mapping helped us to obtain initial spatial and contextual knowledge about Menangkin and the surrounding areas. We let the headman invite 5-7 villagers to participate, and asked participants to map the houses in the village, the road, the (now overgrown) river, and their respective croplands. By facilitating the process as collaborative, we ensured that the final result included multiple perspectives of the village and the surrounding area.

A Seasonal calendar exercise scheduled villagers' labour over the year on how much time they spent managing different crops. Three major cash crops; OP, rubber and pepper were included, plus rice. The focuses were:

- Frequency of applying fertilisers, pesticides, organic fertilisers, harvesting, planting, and trips to the market
- Agricultural labour demand throughout the year
- Seasonal patterns of road conditions

The aim was to investigate the impact of road conditions on market access by determining if seasonal road conditions coincided with harvesting peak periods. Participants were given stones in four different colours, representing the different crops. Stones were then allocated to different sections of the calendar, stating frequency of intervention. The evaluation of the road conditions was an overall assessment, not related to the transportation of specific crops. A picture of the results can be found in Appendix VIII.

Matrix ranking of labour prioritisation helped investigate how households prioritise labour among different activities. Six household representatives, all women, were

invited. Previous exercises had found that women's inputs were subdued in the presence of men, creating imbalances in our results. The activity helped us understand how income is generated, and which crops require most labour allocation. Participants were each given 18 stones to place in the following categories: OP, rubber, pepper, rice, off-farm activities and foraging/hunting. Giving each participant equal amount of stones required them to prioritise activities through selective allocation. See results in Figure 10.

3.5 Transect trip

A transect trip was executed to explore the village and surrounding fields. We observed the village infrastructure, different land uses, and agricultural practices. The transect trip was conducted with the village headman, who drove us in a pick-up truck around the village area. At locations which we or our guide considered significant, we stopped to walk around and discuss various farming practices, crop diversity, village boundaries, and boundaries of smallholder and JVC plots. This improved our overview of local agricultural practices, the topography, road conditions and land use in the area.

3.6 Participatory Observation

To gain a deeper insight into how villagers allocated time and labour in any given day, as well as how they utilised the surrounding land and natural resources, we participated in some of their daily activities, such as fishing, and harvesting of rice and OP. Both rice and OP significantly contribute to village livelihoods; joining villagers during harvests helped us understand both the time and labour investment in these processes. Villagers showed us how to use a small handheld tool (ketap) to cut rice stalks efficiently, and let us try removing OP fresh fruit bunches (FFBs) with a large chisel. The manual labour also afforded ample opportunity to chat with villagers about the history of crops in the village, agricultural management and land use for each crop, and how these activities impacted their daily lives.

3.7 Soil Sampling

Through soil sampling we seek to analyse the nutrient profile of soils from 3 different ages of OP and one control plot of secondary forest (SF). OP sample sites are from a single plot of land, owned by one person, and thus with a singular history of agricultural management. By testing the nutrient profiles from trees of 2, 3, and 4 years[2] it might be possible to assess the rate of soil degradation due to intensive OP cultivation.

12 core samples and 3 SF control samples of 100 cm^3 were gathered at a 0-10 cm depth from 3 random locations per OP age group, located about 1 meter from an OP tree.

[2] The age of OP trees is recorded when the OPs are planted (normally, seedlings are about 1 year old). Thus, it is "age after planting" that is recorded here.

Additionally, auger samples from a depth 0-10cm were collected at the same sites and combined to create one composite sample for each OP age group. Fresh weight of all samples was recorded, then pH and electrical conductivity of each composite sample were measured. Core samples were dried outside, then transported to Denmark where it was prepared and tested for nitrogen and carbon content, organic matter content calculated from the latter.

Figure 2: Map of Soil Sampling Sites

3.8 Global Positioning System measurement

Global Positioning System (GPS) measurement was done to obtain a spatial understanding of the study area and to create maps for visual overview of relevant information. The data gathered with GPS was transferred and synchronised with Google Earth maps to get a visual overview of the village and important waypoints in the village area.

4.0 Results

This chapter analyses and presents our fieldwork findings and subsequent triangulation of data from different methods. Section 4.1 assesses livelihoods, including a brief introduction to the study area, an overview of the land uses of, e.g. crop cultivation, and the role of off-farm activities. Section 4.2 discusses determinants of investing in SSOP by assessing first asset availability across a range of village households, the role of institutions and organisations in mediating access to such assets, and finally how SSOP

is incorporated into the livelihood strategies of various households concerning their respective resource capacities. Lastly, the soil quality of an OP plot is analysed and assessed for potential degradation.

4.1 Assessing Livelihoods

4.1.1 Study Area: Menangkin

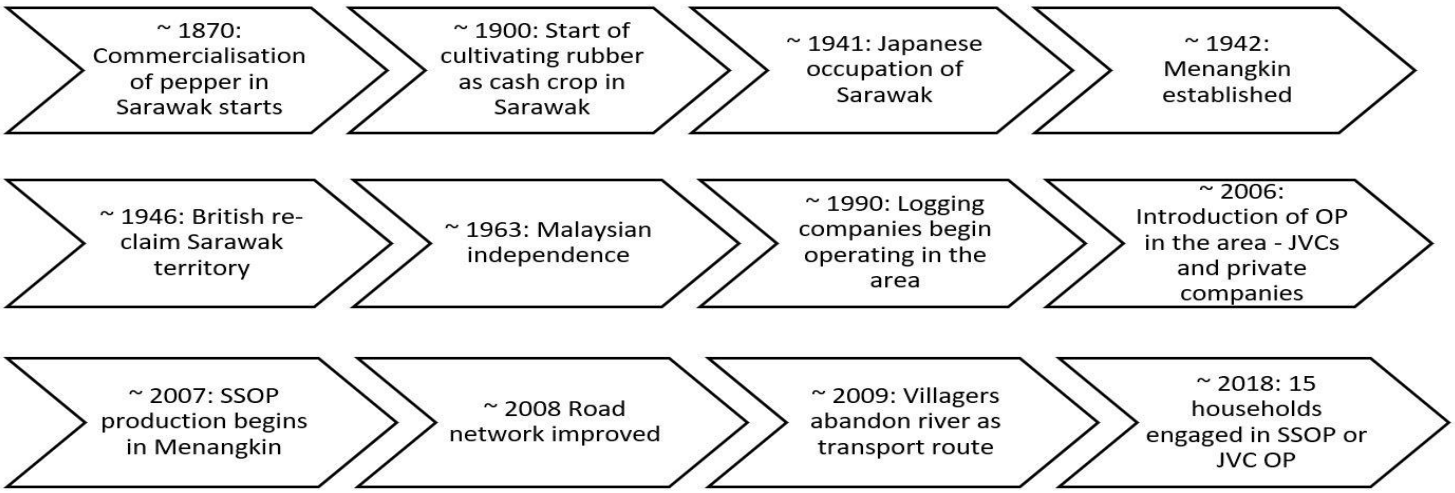

Figure 3: Timeline of Menangkin

This research took place in the village of Menangkin, located in the sub-district of Lingga in Sarawak, Bornean Malaysia. During World War II, Japanese forces occupied Sarawak, subjugating villages and burning crops. Menangkin was established during this time by families fleeing Japanese troops in nearby villages, looking to establish new farmlands. Now, it consists of approximately 31 households of which only 21 are currently inhabited. The members of the other households have either moved or are engaged in off-farm work outside Menangkin and are therefore rarely home.

Figure 4: Map of Sarawak

The village is surrounded by small hills from which the villagers source their water. The settlements are located between these slopes and flat plains, near a small, overgrown river. The landscape surrounding the village is dominated by secondary forest and croplands (primarily cash crops, although subsistence crops such as rice are still grown the village). Historically, the villagers relied heavily on the nearby river for transportation, as it was their only access to the market. Around 10-15 years ago, logging company operations began in the area. This development, and subsequently JVC OP expansion, gave the village access to road networks that have improved market access by enabling transport of crops that could not be transported by boat, and by dramatically reducing the time spent traveling to markets. Regarding current land use, the most dominant crop in the area is OP. This is due to the growth of large plantations owned by JVCs, in which several villagers have contributed lands. However, many of the villagers also produce OP independently. The village has seen a dramatic increase in SSOP in the 21st century alone, with just 1 household cultivating in 2001 to 16 households in 2017.

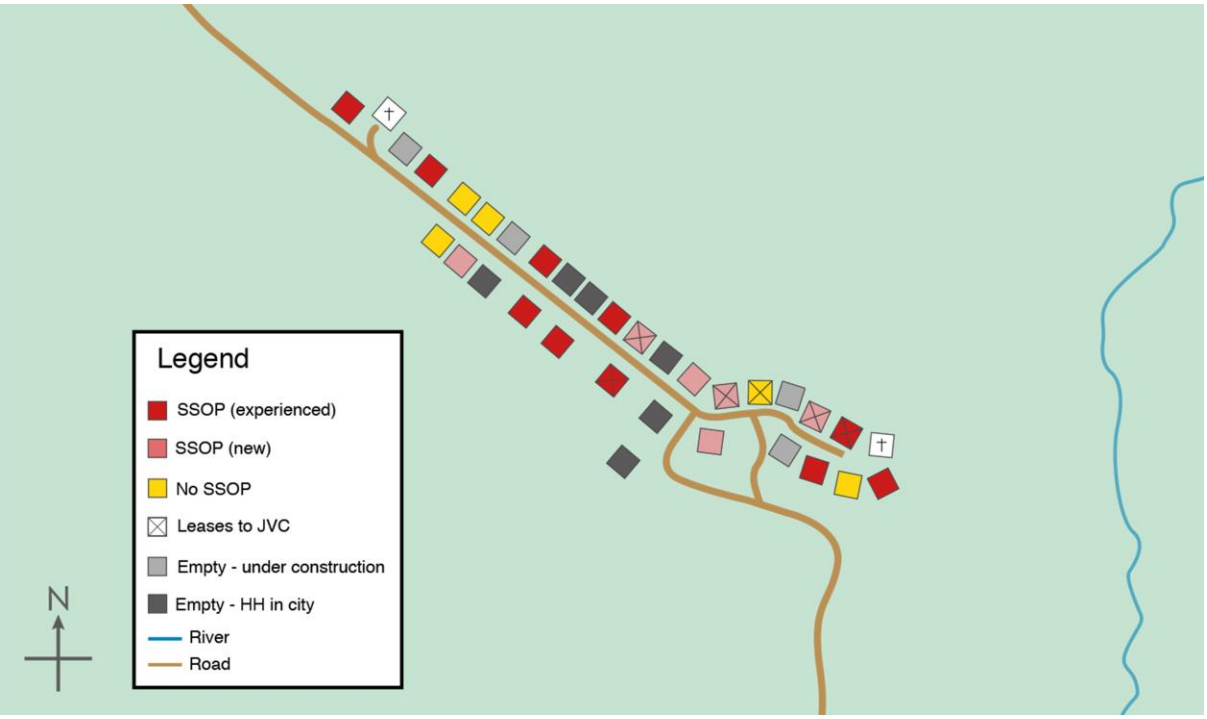

Figure 5: Village map of Menangkin

4.1.2 Overview of Land Use and Agriculture

In Menangkin, all except one household has land used for agriculture to cultivate a variety of crops; 13 households (60%) cultivate 6-9 different crops (Figure 7). Rice is a staple of the Iban diet and the primary subsistence crop for most villagers, with about 70% of households growing swamp or hill rice (see Figure 6). Depending on the time of year, rice cultivation can be demanding regarding time and labour during planting and harvests. For one villager who does not grow cash crops, rice is her priority because "the price of a bag of rice at the market is too high not to grow it yourself" (non-SSOP FGD). To supplement other food bought at the market, the majority of households also cultivate fruits and vegetables, such as durians, jackfruit, pineapples, and cucumbers, as well as collect non-timber forest products (NTFPs). Several households mentioned that they occasionally sell these products to supplement income. However, due to labour shortages and damages incurred during transportation to the market, fruits and vegetables are primarily consumed for subsistence. Cultivating subsistence crops can be classified as a conservation strategy, as it has a long-term perspective and preserving the way of living.

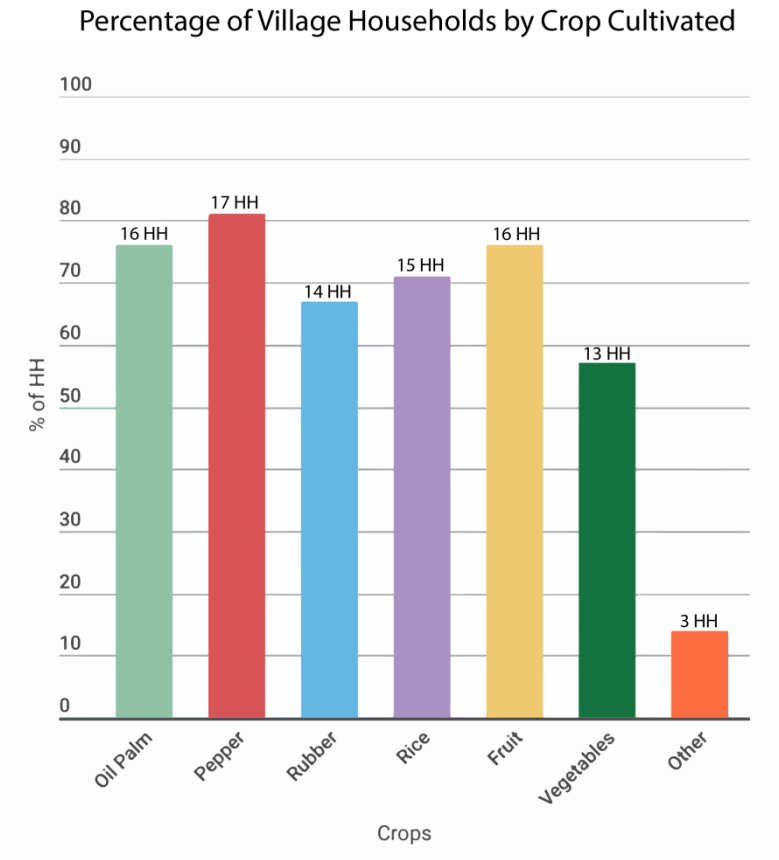

Figure 6: Crops cultivated in Menangkin.
("Fruit" includes jackfruit and durian crops)

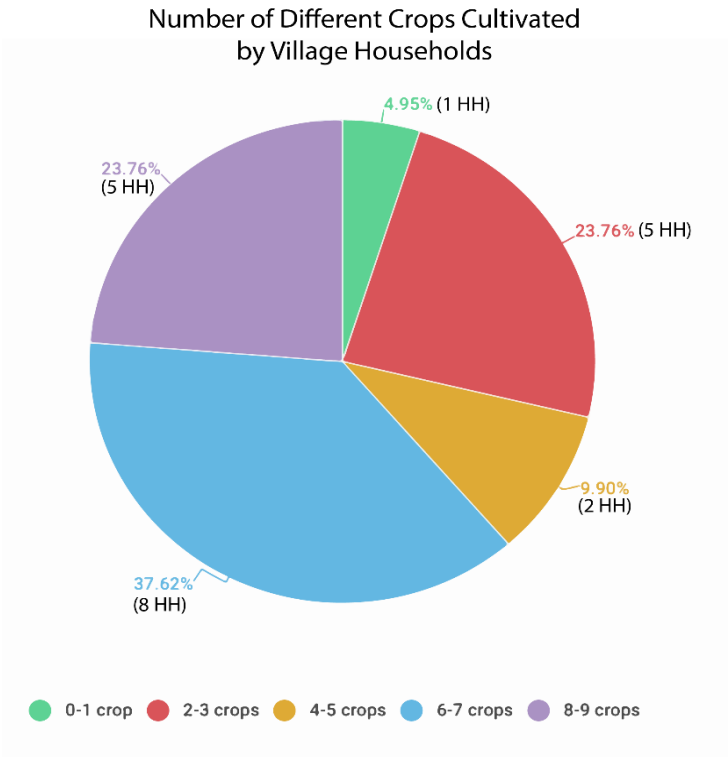

Figure 7: Crop diversification

About 90% of households with cultivated land practice the production and sale of cash crops (Figure 8). Despite the emergence of SSOP as a principle source of income in Menangkin, over 75% of the households growing SSOP maintain at least one other cash crop (QUE) to supplement income and buffer against potential market fluctuations. Cash crop production is the primary income activity in the village (Figure 11) and classifies as a structural improvement strategy with long-term perspective for improving livelihoods (see section 2.0). OP and pepper occupy a majority of the labour share for the households participating in the labour PRA exercise[3]. It seems that for most households cultivating OP, pepper is a secondary cash crop in terms of labour (Figure 10). This is partially because pepper plants require near constant applications of agricultural inputs (fertilisers and pesticides), and individual plants only are harvested once a year (SSI). Mature OP trees, on the contrary, can be harvested twice a month, with more sparing applications of inputs (see Figure 9). Though it requires the most extensive and intensive land use of any crop grown in the village, SSOP provides the most regular income (SSI).

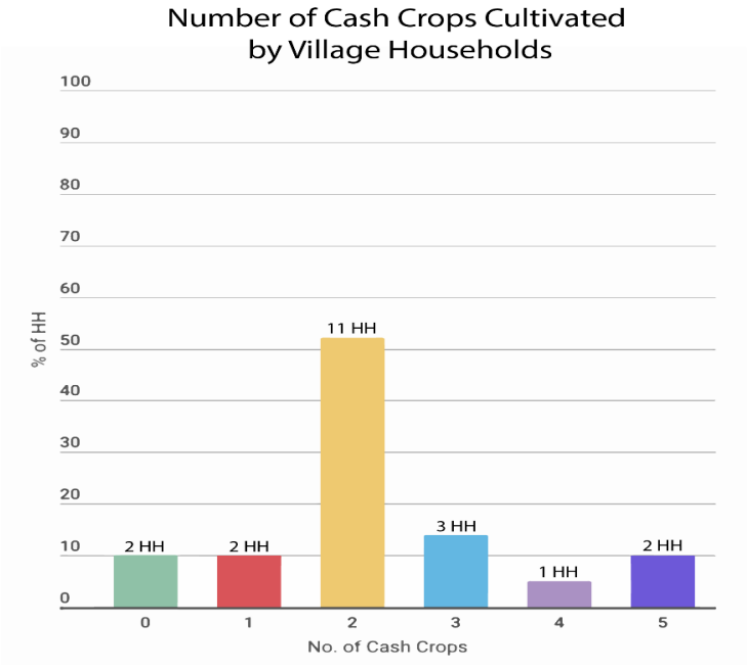

Figure 8: Number of cash crops cultivated

[3] The category of "off-farm labour" is possibly underrepresented in these results, as it might not have been communicated clearly to all participants that they must include the labour shared by the entire household, even those outside the village, as was recorded in the questionnaires. Therefore we find some discrepancies between the labour PRA results and what the same households reported on the questionnaire. Therefore, these results best explicate prioritisation of "in-village" activities. In addition, some of the households do not cultivate rice, and therefore their range of labour activities was smaller than other participating households, skewing the weight of labour allocations.

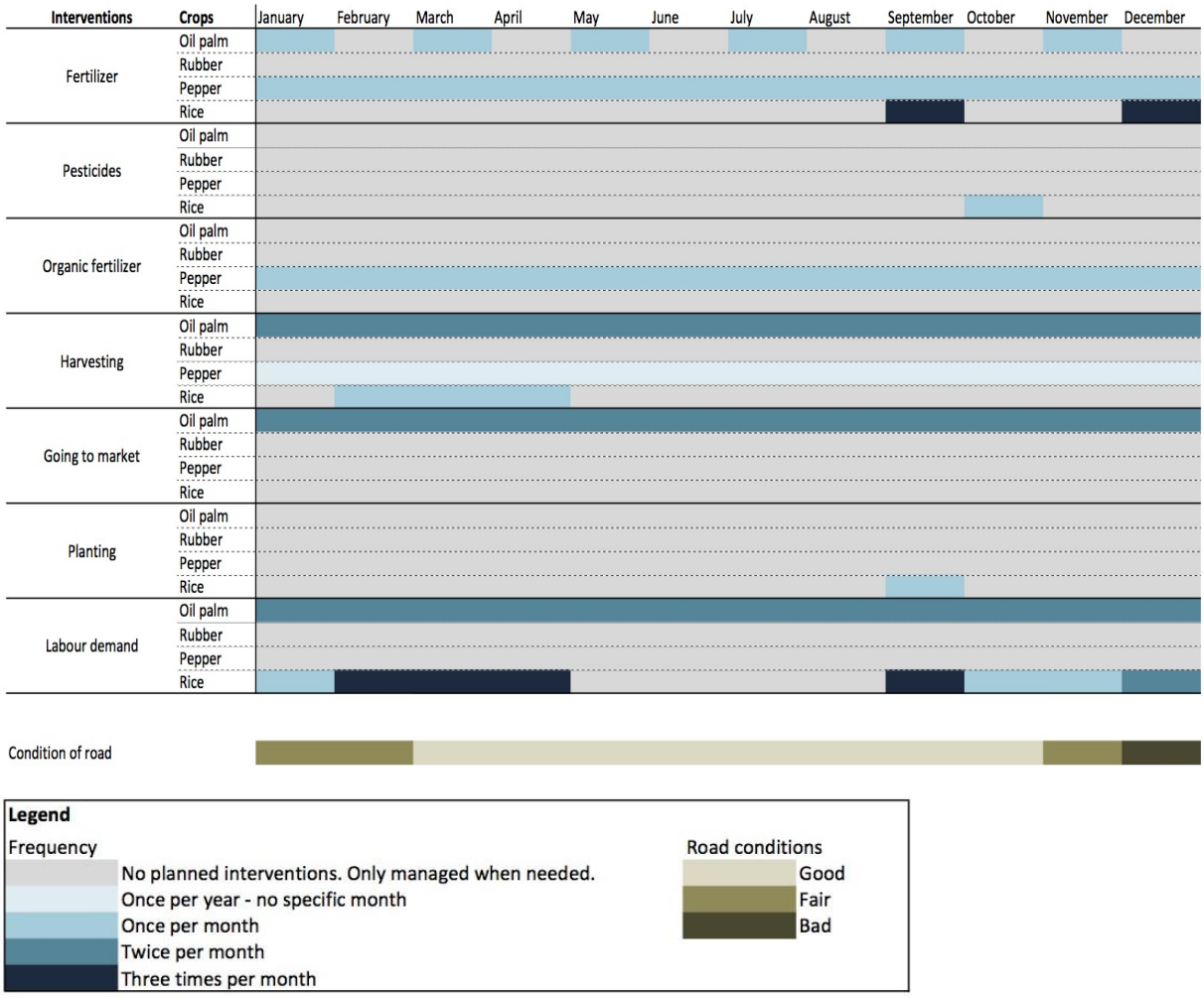

Figure 9: Seasonal calendar

All 7 households that have adopted SSOP within the last 4 years still cultivate pepper and/or rubber, harvesting and "cashing in" the products when the market prices are high (SSI; QUE). For example, as is shown in Figure 6, rubber is cultivated by many households (about 67%). Yet as shown in Figure 10, it is not a top priority for villagers that have it. This is because rubber trees are often maintained by families but only tapped when the market price is optimal, which occurs around every 10 years (SSI).

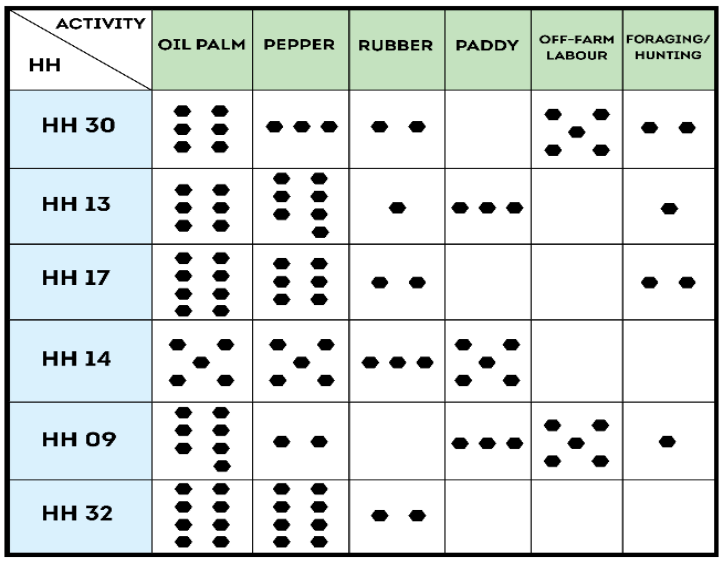

Figure 10: Labour PRA

From conversations with villagers, we found that those who have been harvesting SSOP for several years have a more pragmatic view about maintaining cash crop diversity, in case OP prices drop. For example, a villager who has cultivated OP for 10 years mentioned that he still leaves land fallow for future profitable cash crops. On the contrary, households just beginning SSOP tend to express greater desire to specialise, wishing to devote more labour and resources to OP than other crops. For example, a household just beginning OP says they "would only cultivate OP in their future, [they] don't even want to think about pepper" (SSI). This tendency is also reflected in the labour PRA, where households that reported allocating the most labour to OP (HH09, HH17, HH30) have all been cultivating OP for 5 years or less (Figure 10). However, it should be noted that OP trees require the most maintenance in the first 4 years before maturation, which can explain notable labour prioritisation during the early years of cultivation (SSI).

4.1.3 Income Activities

Aside from cash-crop production, off-farm labour either in the surrounding area or cities is often a household strategy of reducing seasonal income variability. About half of households interviewed (11 HH) have at least one family member that works outside the village and contributes to the household income through remittances (Figure 12). In some cases, villagers with larger areas of OP use off-farm labour to help fund the initial material and labour investments of SSOP making off-farm work outside the village contribute to a structural improvement strategy. Other villagers say SSOP reduces the need for off-farm labour, as the year-round maintenance, coupled with the consistent harvests, provides regular work that can minimise income variability. Furthermore, the

high operating costs of SSOP require many households to turn to family members as the primary source of labour, providing year-round employment for households (SSI).

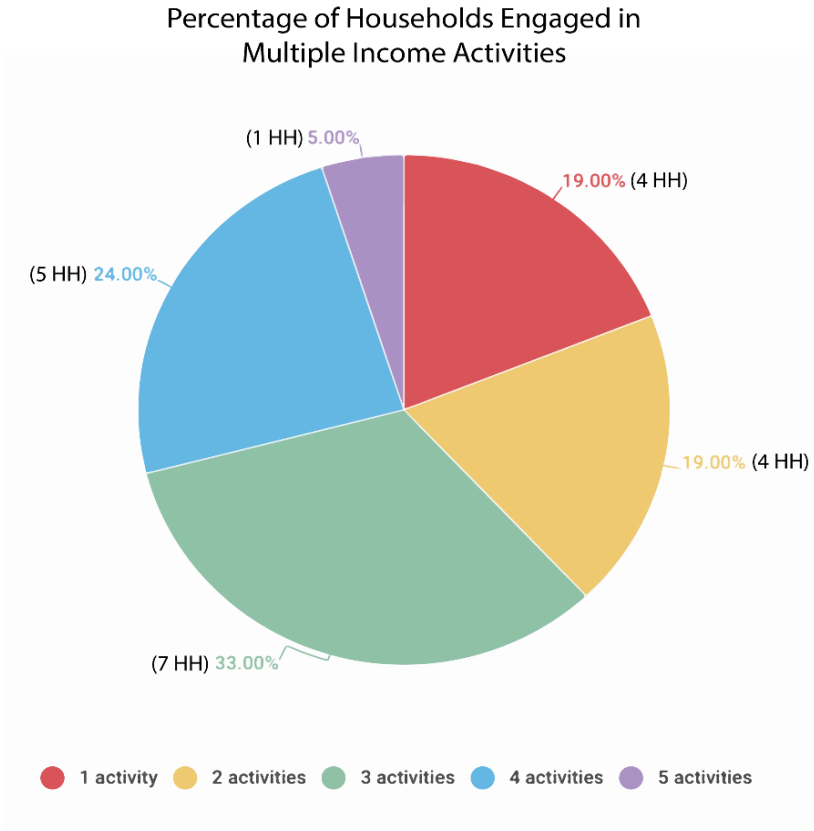

Figure 11: Number of income activities

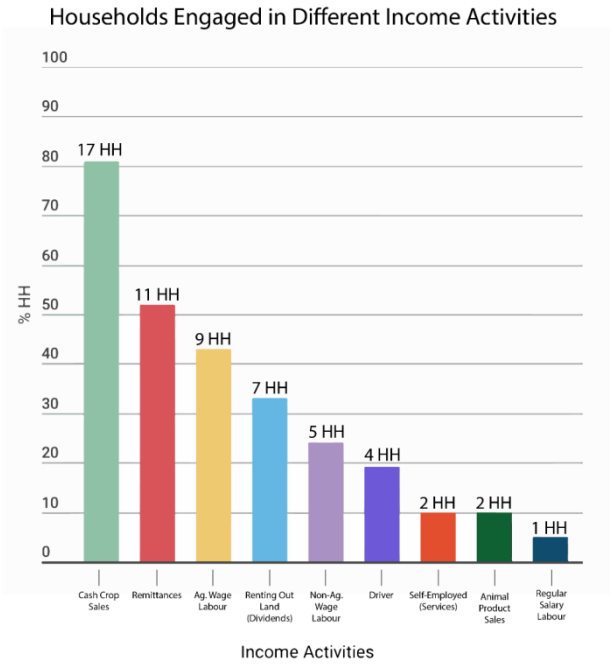

Figure 12: Income activities

While some families exclusively work in cash crop production, no household relies completely on SSOP cultivation for the entirety of their income (QUE). 13 households (62%) are engaged in 3 or more different income-generating activities (Figure 11 and Text Box 2). Figure 12 details household participation percentages for different income activities in the village. The majority of households combine cash crop production with one or more different sources of off-farm income, principally money from rented land in the form of dividends and/or from family members working outside the village in the form of remittances (QUE). In the village, 9 (52%) of the households cultivating cash crops also receive remittances, and 7 of the households (41%) receive dividends. In total, about a quarter of household members in Menangkin are working outside the village, primarily in urban areas of Sarawak. 24 villagers (22% of the village) were working outside Menangkin in 2017; 15 of them support their families through sending back remittances. Three out of the four households that do not cultivate cash crops are engaged in agricultural wage-labour (QUE). This indicates that families that cannot afford to grow cash crops on their land and do not have the resources to live outside the village, subsist through working on others' land. Wage labour can be characterised as an opportunistic strategy as wages are used to improve basic livelihoods conditions, with a short-term perspective. A minority of the villagers include selling livestock or working as drivers, transporting crops, villagers, and occasionally tourists (Text Box 3), into their income portfolios.

Text Box 2: Livelihood Portfolio of HH18

Household 18 counts for three members, a father who is head of the household, mother and an adult son named Ibrahim (age: 47). Ibrahim was a successful accountant in Miri where he managed more than 100 people. His income was high, but so was costs of urban living. He was worried about his future and future of his children who were about to go to university. After calculating on possible income from cash crop production, he decided to leave his job and return to Menangkin. Today Ibrahim cultivates OP, pepper and rubber and he is considered as one of the most successful farmers in the village. He states that he owns more than 1,000 hectares of land, part of which he leases out to JVC, providing him with dividends every third month. Ibrahim is also referred as the village middleman since villagers hire him to deliver OP to the market. Ibrahim says that now he earns much more money compared to what he received as an accountant. He considers his OP plantation as his pension fund, provided by the long life cycle of OP. He also perceives rubber as the best investment despite current low price because it almost does not require any maintenance, and when the price increase he will send people to tap it, referring to rubber as "the forest ATM".

Collecting natural products is also a significant off-farm activity, contributing principally to household subsistence. All village households are gathering edible plants, and more than half of them are fishing, hunting, gathering fodder, fuelwood and raw materials (see Figure 13). The majority of households gather these materials for day-to-day consumption with a long-term perspective and preserving goal; these activities can, therefore, be classified for most households as a conservation strategy.

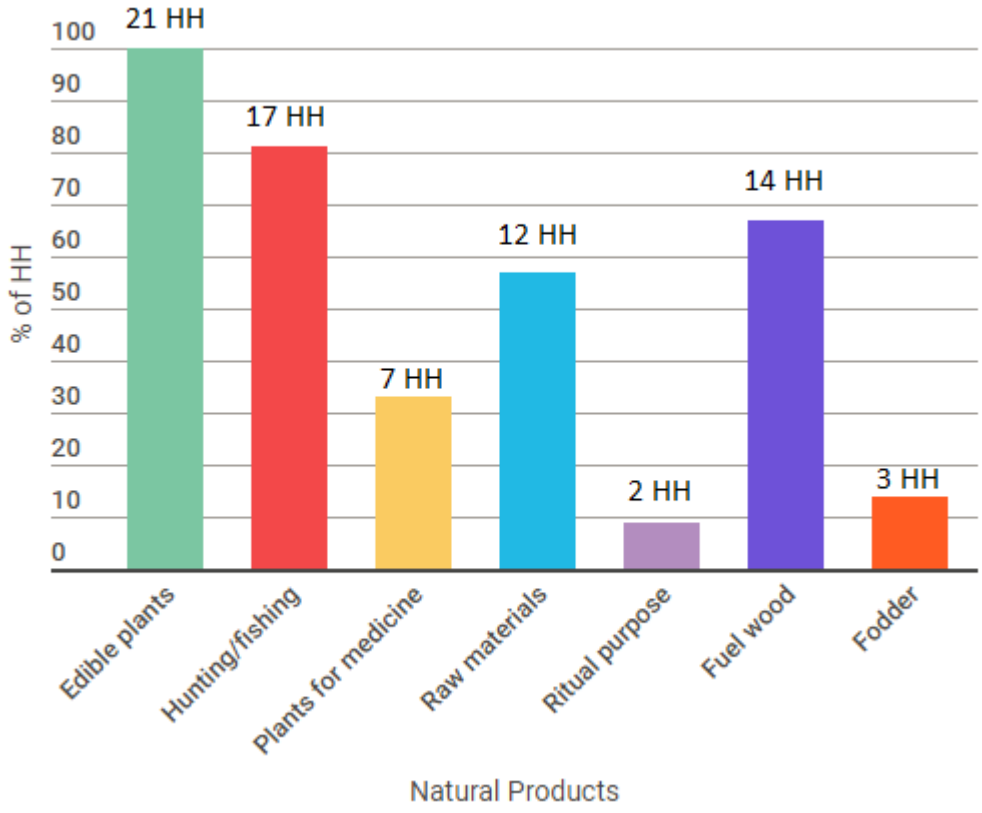

Figure 13: All households in Menangkin gather natural products, contributing to sustaining livelihoods. The chart represents percentage and number of households gathering natural products.

Text Box 3: Tourism

In September 2013 Sarawak Forestry Department declared 595 ha of Mount Lingga a national park named Taman Negara Gunung Lesung or Mount Lesung National Park (MLNP). MLNP can be accessed by several ways, one of which is by a road that leads through a sister village called Lalau. In the nearby area, another touristic attraction is placed, the enchanting Tubah waterfalls. Two roads lead to the Tubah waterfalls, one of which leads through Menangkin. The area of MLNP and the Tubah waterfalls are occasionally visited by hikers mainly on weekends and public holidays. Some villagers provide service guidance and transport to visitors. Guidance and transport in MLNP area cost up to RM 100 per trip, and RM 25 per person to the Tubah waterfalls with an entrance fee of RM 5. However, the price of service is not fixed, and it depends on negotiation skills of both villagers and tourists. Since the establishment of MLNP, villagers of Menangkin have noticed a discernible increase in the number of tourists, however, most of them do not engage in and profit from tourism.

4.2 Determinants of cultivating SSOP

4.2.1 Economic Incentives

During our stay in the village, we found slightly different perceptions from the villagers on how market prices of crops have changed in the past and will continue to do so. However, the majority that were interviewed are aware that prices may continue to fluctuate as much as previously. Therefore the trend for SSOP cultivators is to keep some of their 'old' cash crops as insurance if the prices on OP should go down. For example, one villager mentioned, "we are very aware of the price fluctuations of the crops. Therefore we keep a diverse variety of crops" (USI).

Figures 14 and 15 use official market data to show how the market prices have been fluctuating over recent decades, which corresponds with villager claims. As the graphs illustrate, the only crop that has a relatively steady market price is rice. OP is in general more unstable than other cash crops. Yet because it is higher yielding, and provides a steadier income relative to other crops while being less labour demanding, the total income is higher from OP than from other cash crops.

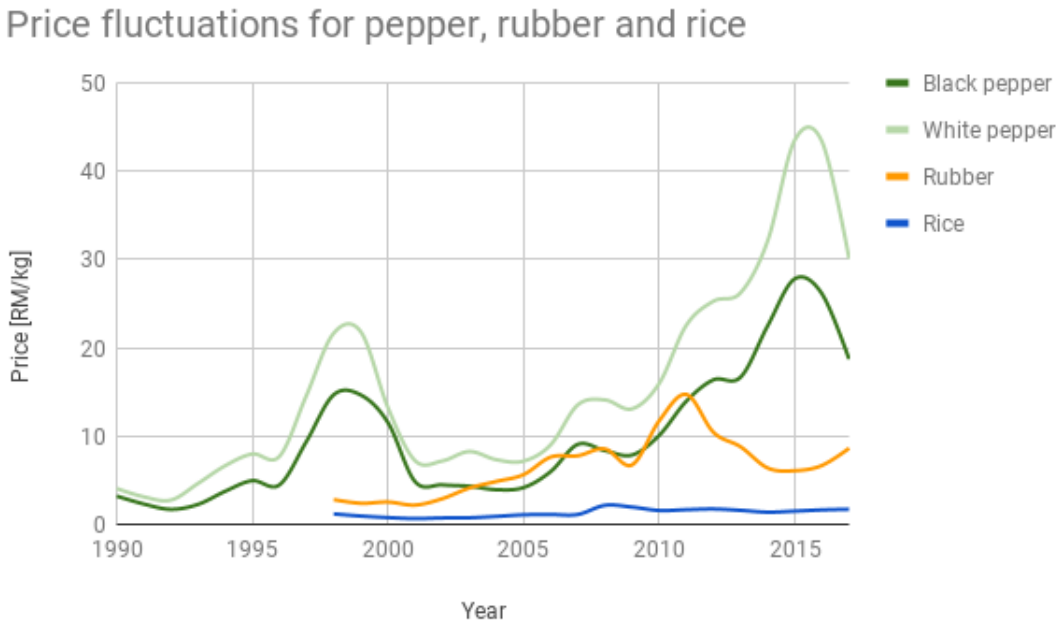

Figure 14: Price fluctuations for pepper, rubber etc: The chart shows how the prices have been fluctuating during the past 28 years for pepper and the past 20 years for rubber and rice. Rice is more or less steady whereas the cash crops rubber and pepper vary more over time (sources: MPB (2018), Index Mundi (2018a,b))

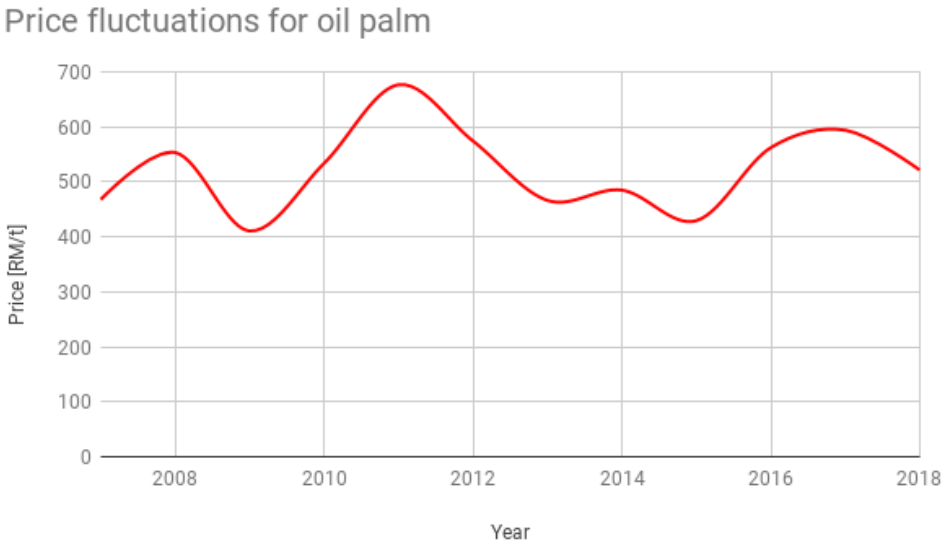

Figure 15: Price fluctuations for OP:
Price of OP during the past 10 years for grade B quality[4]. Prices are less unstable now compared to earlier, but also lower (source: MPOB, 2018).

> "*A good farmer keeps at least two of the three cash crops to cope with the fluctuating prices. Rubber prices are low at the moment, but we keep them and harvest when the prices are high - they work almost like an ATM for us*" (SSI).

Cash crop diversification as a market buffering strategy is practiced by those who have been growing OP for some years, and therefore have an economic surplus so they do not have to harvest their crops all the time, but instead wait for the right time to harvest. On the other hand, the fluctuating prices make the villagers with a limited amount of land and money vulnerable. They do not have the economic surplus to only harvest their pepper and rubber when the prices are high.

Inputs like fertilisers and pesticides are provided by the government for rice, pepper and OP. However it can be difficult to get hold of fertilisers for pepper and OP, so villagers often use the inputs they receive for rice on their OP plots since most of the villagers cannot afford to buy the amounts of fertiliser needed for OP.

Calculations on how much the villagers gain from converting to OP could provide us with specific data on OP contributions to villager incomes. Although we did manage to collect data on the villagers' direct income from their crops, the units given in responses could not be standardised, preventing any village-level analysis. We also found large variations in questionnaire data for other factors such as transport costs, agricultural input costs, and differences in yields per area, which impacted the accuracy of the results.

To fully understand how the emergence of OP has impacted agricultural patterns in the

[4] Grade B is chosen from the possible grades; A, B and C, as it is the medium level. Price fluctuations remain constant across the different grades.

village, it is essential to consider the previous land uses. Even though the fieldwork did not approach this question in a structured way, we met instances of villagers who converted fallow land into SSOP, and some villagers mentioned that they previously cultivated hill rice or rubber on their current SSOP fields. This suggests that rising popularity of OP has incentivised villagers to expand agricultural lands and in some cases abandon certain crops to prioritise OP.

Text box 4: Road and Transport

Before the road was built, villagers relied on a river as the only channel to markets and the outside world. Transport by boat was time-consuming, but cheaper compared to today's road transport. The road was introduced by logging companies, and are today maintained by OP companies, exporting OP out of the area. The road makes it possible for villagers to transport goods to market with pick-up trucks or motorcycles, or by middlemen collecting their crops (see Figure 16). However, the road network is in poor condition, prone flooding in the wet season, cutting off villagers from the outside world. Pepper can be stored for many years, and income from harvests is therefore not affected by limited market access in the wet seasons. OP on the other hand is harvested twice per month and has to go quickly to the market, so flooded roads postponing the market access can cause profit losses. Overall, improved road conditions could incentivise villagers to produce more cash crops, as transport would be faster, and there would be less need for vehicle repairs from damages incurred during transportation to the market.

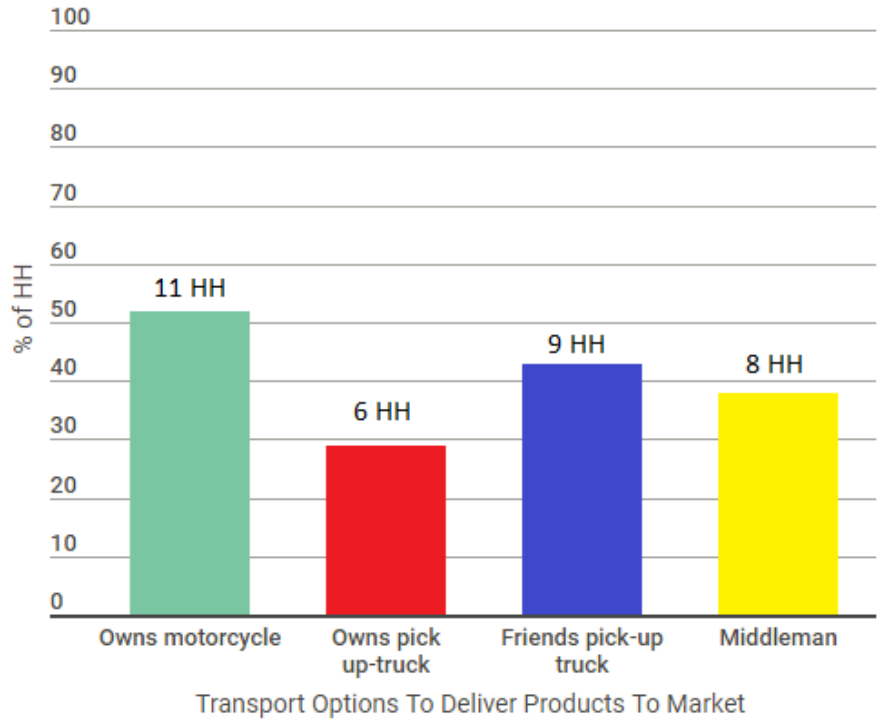

Figure 16: Transport options to deliver products to market. The figure represents percentage and number of households using different transport options to deliver products to market.

4.2.2 OP Sales Channels

According to Ribot and Peluso (2003), access is "the ability to derive benefits from things". Increased accessibility to resources, services and markets can thus improve rural livelihoods (Thanichanon et al. 2013). Menangkin is connected with Pantu market through a network of dirt roads which are in a severely poor condition. According to villagers, transporting agricultural products to Pantu Market is a long, slow and exhausting experience, as well as damaging to vehicles. Villagers growing OP have different opportunities to transport FFB to the market (see Figure 17):

- Deliver to the mill themselves
- Sell to a 'village-middleman' who transports it to the mill or mediator
- Use a mediator (middleman) (RM 50 per tonne or RM 100 per trip)

Villagers profit about RM 60 more per tonne when selling to the mill compared to the mediator. However, at the mill, villagers have to queue up for several hours to sell their products. Furthermore, the mill pays on a monthly basis, whereas payments from middlemen are immediate. A critical determinant of delivering FFB to the market is possession of a vehicle. Villagers must transport FFB by pick-up trucks. A load around 1.4 tonnes of FFB for one trip is considered safe, and 1.8 tonnes is the maximum weight. However, villagers sometimes load more than 2 tonnes of FFB into their trucks to minimise trips to the market. Two types of licences for OP management exist, one for producing OP and one for collecting and selling FFB. Villagers who farm OP, but for various reasons do not possess a licence to produce it, do not have a legal right to sell it. The village middlemen therefore profit by purchasing their products, but at approximately half of the price that they would get at a mill. This results in limited bargaining power for individual sellers who rely on village middlemen to transport their OP to the mill.

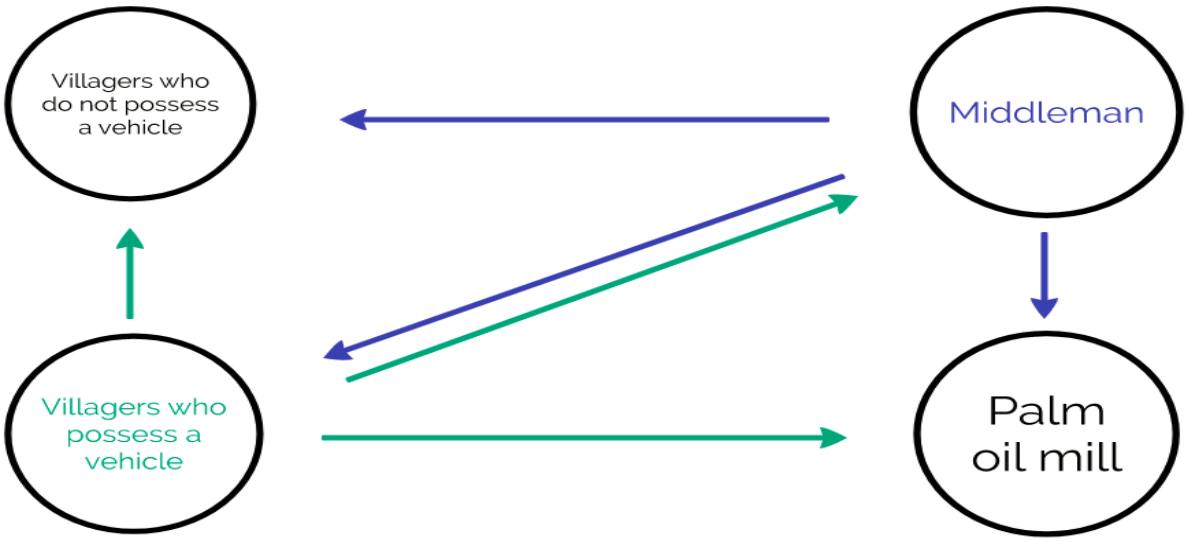

Figure 17: Relationships between actors in oil palm sale channels

4.2.3 Assessing Asset Availability for Starting SSOP

The sustainable livelihood framework (DFID, 1999; Ellis, 2000; Scoones, 2009) illustrates how the access to assets by individuals or households can help inform the mechanisms behind a household's choice to engage in an activity. The following asset pentagon demonstrates differences in asset availability as determinants of investing in SSOP. The pentagon includes two households growing SSOP: HH32, which has grown OP for 11 years, and HH12, which is relatively new to OP cultivation (3 years), and two households not cultivating SSOP: HH02, which is planning to grow SSOP, and HH31, which will probably not be able to grow it in the near future.

The different capitals feature assets found to affect the ability to grow SSOP[5] (see appendix IV for villager quotes on motivations and constraints to grow OP). Thus, the pentagon shows the availability of assets for four households' that determine their ability to cultivate SSOP if they are present, and limit them from growing SSOP if they are not. This means that the results of the pentagon are exclusively in the context of SSOP cultivation, and do not represent general household assets. Assets are ranked on a scale from 1-5 as subjective estimates based on both qualitative and quantitative data, not on concrete numbers for capital levels. The scale is relative to a typical household in Menagkin, not accounting for extreme cases, such as the natural capital of a wealthy household stating that they owned +1000 ha of land. The four households' asset availability in relation to SSOP is elaborated below.

[5] Specific capitals are determined on the basis of obtained data. Physical capital could also include infrastructure, that is, road access to the land plots each household owns, and for natural capital, steep terrains could be a limiting factor of available land assets. However, as we did not include specific questions on either roads access or slopes for specific lands in our survey, this could not be included in the weighting.

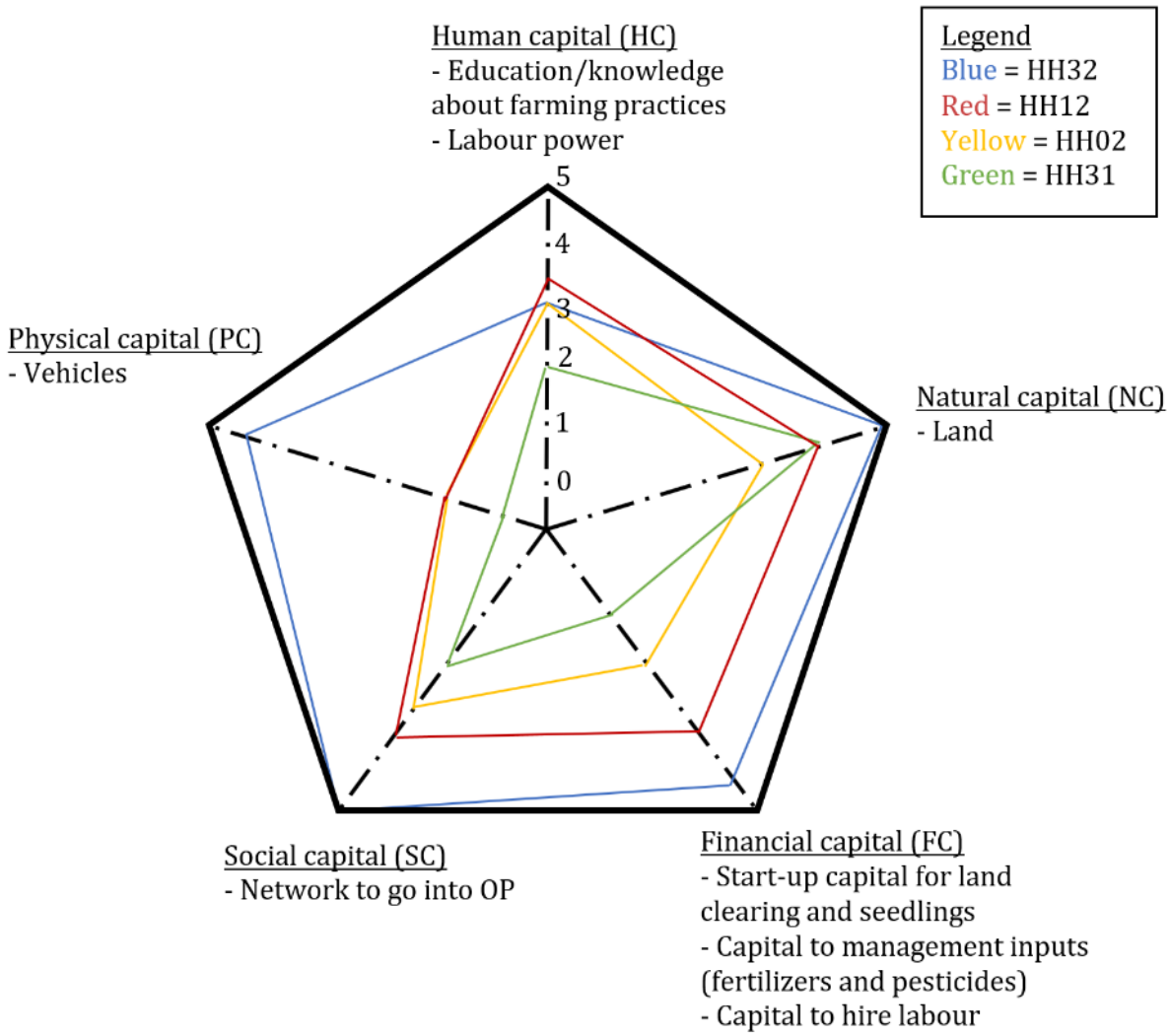

Figure 18: Asset pentagon on capitals determining ability to grow SSOP

HH32 started to cultivate SSOP in 2008, and now has OP on at least 8 ha of land. Only two persons live in the household full-time, the headman (63) and his wife (58). They are both physically unable on the OP, but they know the best management practices; this knowledge supplements their otherwise low labour capacity and raises their human capital to a medium level (HC=3). Their initial SSOP cultivation was motivated by family members who were involved in OP trade, and a friend of the family working in the Malaysian Palm Oil Board (MPOB) helped facilitate the start-up processes, providing his knowledge of farming practices, prospects for market prices, and cheap OP seedlings. This indicates a strong social network (SC=5). The start-up capital for SSOP came from pensions from former city work. Now, the money earned from OP production is the primary income. This income allows the household to pay villagers for labour and to buy inputs, such as fertiliser and pesticides. However, it can be a challenge to buy and apply sufficient fertilisers to the palms. Their current budget is not high enough to clear new land to expand the SSOP, but overall their financial capital is high (FC=4.5). This

has helped the household invest in a pick-up truck that can transport about 2 tonnes of OP to the market per trip, raising the physical capital level (PC=4.5). The household is only constrained by their budget to clear land, as the natural capital to expand the OP is ample. They own so much land that "they would not be able to show it all to us in one day," as they said (NC=5).

HH12 is on their third year of SSOP cultivation. The household consists of six members, two of them work as farmers (age: 60 and 59). They can provide enough labour power to cultivate OP and only require outside help to clear land. The head of household finished secondary school, and one other household member works as wage labourer on an OP plot providing practical knowledge on management practices. This results in relatively high human capital (HC=4). Income is provided by 5 household members from selling crops (OP and pepper) and remittances from work in cities. Use of fertiliser is high, indicating ability to purchase inputs. However, financial capital is not high enough to finance a pick-up truck (FC=3.5), so they must use a motorcycle to buy inputs and have their OP transported by another villager who acts middleman (PC=1). Natural capital is relatively high as they own 12 ha of land, allowing them to expand OP in the future (NC=4). Social capital is above medium (SC=3.5) due to their connection with a Chinese merchant, who sells them seedlings and supervises their OP management.

HH02 does not cultivate SSOP but plans to as soon as she can afford it. 2 out of 6 household members work as farmers (age: 59 and 19), currently for subsistence. One member has previously worked on HH01's OP plot, and therefore has some knowledge on OP, resulting in medium-level human capital (HC=3). This former employment motivated the household to plant OP themselves, indicating the importance of the relation with HH01 as inspiration, resulting in medium social capital (SC=3). The household already cleared land for OP, but only owns about 5 ha of land. This is enough to plant OP, but not much considering how much land each palm requires, and a concurrent prioritisation of subsistence crops and pepper on this land (NC=3). Income is generated from wage labour and remittances, but no crops are sold at the time. The household indicated that they would have to reduce their food budget to invest in OP, demonstrating a low-level financial capital (FC=2). The household owns a motorcycle, but no other vehicles, indicating low physical capital (PC=1).

HH31 does not cultivate SSOP or any other crops. They used to grow pepper and rice, but those have died. The household consists of the two grown-ups, the head of household (38), his pregnant wife (25), and their small son (3). Thus, the only current labour source is the head of household. No formal education is provided, but some practical knowledge is obtained, as the head of household works on another villager's OP plot. Altogether however, human capital is limited (HC=2). The only income generating activity is the OP wage labour, generating RM 60 per workday, which for them is not enough to invest in new crops while also supporting the daily lives of the family. If they did not have the money and time constraints, the household would ideally concentrate only on starting SSOP, but right now financial capital is too low (FC=1).

Beside the work on the OP plot and their village neighbours' cultivation of SSOP, the household did not seem to have any social connections to the OP industry, indicating limited social capital (SC=2). Physical capital is 0, as the household does not own any vehicles (PC=0). Natural capital is the only capital not limiting OP cultivation, as they have what they call "a lot of uncultivated land" available (NC=4).

Summing up, access to assets has an important impact on an individual household's room for manoeuvre and thus their ability to join SSOP cultivation as a livelihood strategy. Financial capital is the most limiting factor for beginning SSOP, also affecting access to physical capital (vehicles). Natural capital can be a limiting factor for some households (e.g. HH02), but even when land seems abundant (HH32, HH12 and HH31), financial capital is vital to start cultivating it. For the two households not cultivating SSOP, remittances and wage labour are the only income generating activities.

4.2.4 The Role of Organisations and Institutions

In addition to household-level resource bases the accessibility of assets required to begin and successfully cultivate SSOP is also mediated by organisations, such as the Sarawak government and private sector businesses, and/or institutions, such as social networks/communities. In this case, one of the principal determinants of cultivating SSOP is adequate start-up capital, which includes money for labour and inputs. While the above asset analysis reflects the institutional importance of social networks in order to cultivate SSOP, there is still a need for organisational assistance in the form of subsidized resources. Our fieldwork data indicates that while families often can easily access government assistance for rice cultivation, there are not many government subsidies for OP inputs. One household, for example, had signed up to receive a subsidy from MPOB that will cover the labour and inputs required to clear land and plant 300 OP seedlings. So far, they have waited 4.5 years and have still not received the subsidy. Furthermore, perhaps due to the international community's perception of OP as ecologically destructive, we observed an absence of NGO or civil society organisation aid being given to facilitate OP cultivation, even for smallholders. Other studies have produced similar findings, describing SSOP cultivators as disconnected from both NGOs and consumers (Martin et al., 2015; Oosterveer 2015) .

In addition, other research in the area states that in general, independent Malaysian OP farmers "receive limited institutional, technical and financial support and lack knowledge regarding best practices and new technologies" (Nagiah and Azmi, 2012). A 2008 study found that independent SSOP cultivators in Malaysia produce OP less efficiently than plantations due to poor agriculture practices such as applying insufficient fertiliser and using poor quality seedlings (Rahman et al., 2008). While we did not measure efficiency of SSOP yields in Menangkin, we found that SSOP farmers struggled to apply enough fertilisers to their OP due to high cost of inputs and lack of subsidies for OP cultivation materials. By not actively aiding SSOP production, the Malaysian government is effectively incentivising smallholders to contribute their land

to what they deem as more productive, private sector development. This is done through a JVC, an agreement between the private investor, the contributing landholders, and the government (Cramb 2013).

While only 6 households in Menangkin participate in JVCs, we encountered a wide range of opinions on the matter. Two households with the assets available to cultivate SSOP, and have for a long time, see participating in JVCs as a viable option if your land is difficult to manage, ie. swampy or far from your house. Yet another house with a lot of experience in SSOP regards JVCs as exploitative. Several households that have just begun harvesting SSOP have a similar view, saying that they prefer managing their own OP to directly profit from the land. One household reasoned that JVC dividends are low, and only every 3 months, whereas SSOP profits per harvests are twice a month. We observed households without SSOP however as considering JVCs as an attractive option. One household asserted that "OP in any form is desirable" (Non-SSOP FGD). Without the start-up capital to profit directly from SSOP, it appears that such households would find the JVC dividends as sufficient regular income. Thus, it can be concluded that organisational aid for SSOP is either non-existent (from outside organisations) or selective (from the Sarawak government); lack of monetary aid for SSOP can constrain households from beginning independent cultivation, whereas the greater accessibility of government-sponsored JVCs entices households to rent out their land to private agribusinesses.

4.2.5 Incorporating Oil Palm into Livelihood Strategies

The growth of OP in Menagkin and the surrounding area introduced a range of OP-associated activities to villager livelihood portfolios; as a result, villagers are incorporating OP into their livelihood strategies in different ways. Besides cultivating their own SSOP, villagers have the option of leasing out land to JVC (receiving dividends in return), working as wage labourers on other villagers' OP fields, or transporting OP for other villagers. These activities correspond to livelihood strategies that each have distinct goals and time perspectives for different villagers. These strategies can be categorised into opportunistic, structural improvement, conservation or recovery livelihood strategies respectively, according to the framework by Dietz, explained in section 2.0 (Figure 1). Table 2 gives examples of how different activities related to OP are classified as corresponding to different livelihood strategies.

Table 2: Villager OP activities classified by livelihood strategy

HH OP activity	**Motivation**	**Interpretation/ reason for classification**
Structural improvement strategy		
Grows SSOP (experienced)	HH18: Returned to the village because he saw the opportunity to grow OP. OP does not require constant attention and will not die if	The goal is to accumulate capital and increase of welfare in a long-term perspective, valuing greater opportunities for investment and

	neglected. Easier to get bank loans, because OP is perceived as steady income. The receipt for OP-sale is as credible as a paycheck. Now he can pay for his son to go to university.	future of his child.
Grows SSOP (new)	HH30: She sees how rich SSOP makes people, and that it requires little maintenance after the start-up phase, want the same. She wants to earn money to keep the children in school, because she values education.	The goal is to accumulate capital and increase welfare in a long-term perspective, valuing the future of the children.
Opportunistic strategy		
Village-level middleman	HH18: With his pick-up truck (that he also uses to sell his own OP), he can take money for transporting OP for villagers without trucks, either to big middlemen or directly to the mill.	Short-term strategy to earn an extra income on top of his own SSOP business. No investment was required, as the vehicle was already purchased to fulfil another strategy (to grow SSOP).
Wage labour on another villager's OP farm (formerly)	HH02: The household used to work on another villager's OP fields, this provided her with income. She does not work there anymore but has been inspired to start cultivating her own OP.	Short-term goal to make an income without having to invest to do so, improving the wealth and future opportunities of the household to aim for other livelihood strategies.
Conservation strategy		
Grows SSOP (experienced) and has JVC	HH26: Has SSOP and JVC to claim his rights to the land and keep all his land cultivated, because he is afraid that private companies would otherwise take his land - and land is very precious.	The goal is to preserve his land, and with OP, he can make sure to keep it for a long time.
Grows SSOP (experienced)	HH32: Prioritises SSOP rather than JVC, he thinks people get tricked when renting out their lands.	To keep himself from being taken advantage of, he chooses to cultivate OP himself, keeping out of long-term contracts and preserving the rights to his land.
Recovery strategy		
Works on neighbour's OP	HH31: All their crops have died. Only income generating activity is wage labour on OP, earning RM60 per workday (QUE)).	Recovery from lost crops is needed because finances are low, and hired labour on the OP is an easy short perspective strategy, making them able to adapt to the change of died crops.

The long-lasting nature of OP trees makes the introduction of SSOP or OP in JVCs a long-perspective livelihood strategy. With the goal of accumulating capital and improving conditions, a structural improvement strategy can be identified, whereas households focused on keeping the rights to their land are motivated by a conservation livelihood

strategy. The associated activities of farm labour and transport implies a short-term perspective, either seizing a sudden, non-permanent opportunity to earn an income, implying an opportunistic strategy, or a recovery strategy when required by a short-term need for capital to adapt from a shock. These goals and strategies are not all mutually exclusive, as e.g. SSOP cultivators can have both improving and conserving goals (HH26 and HH32 are not only conserving, but also improving), and one household can do both direct and associated activities (e.g. HH18). Short-term strategies can also facilitate the ability to pursue long-term strategies later on, as e.g. opportunistic wage labour by HH02 has made her aim to plant SSOP in the future.

4.2.6 SSOP and Soil Quality: Assessing Changes

As increased application of fertilisers artificially maintains soil fertility for longer periods, reducing need for traditional shifting cultivation practices. OP can maintain productivity up to 30 years; therefore, many OP farmers do not plan to shift field plots in the foreseeable future. Soil samples were made on an OP field, previously exposed to swidden cultivation, the history of the land being: forest→ burned→ rice→ burned→ rubber→burned→OP

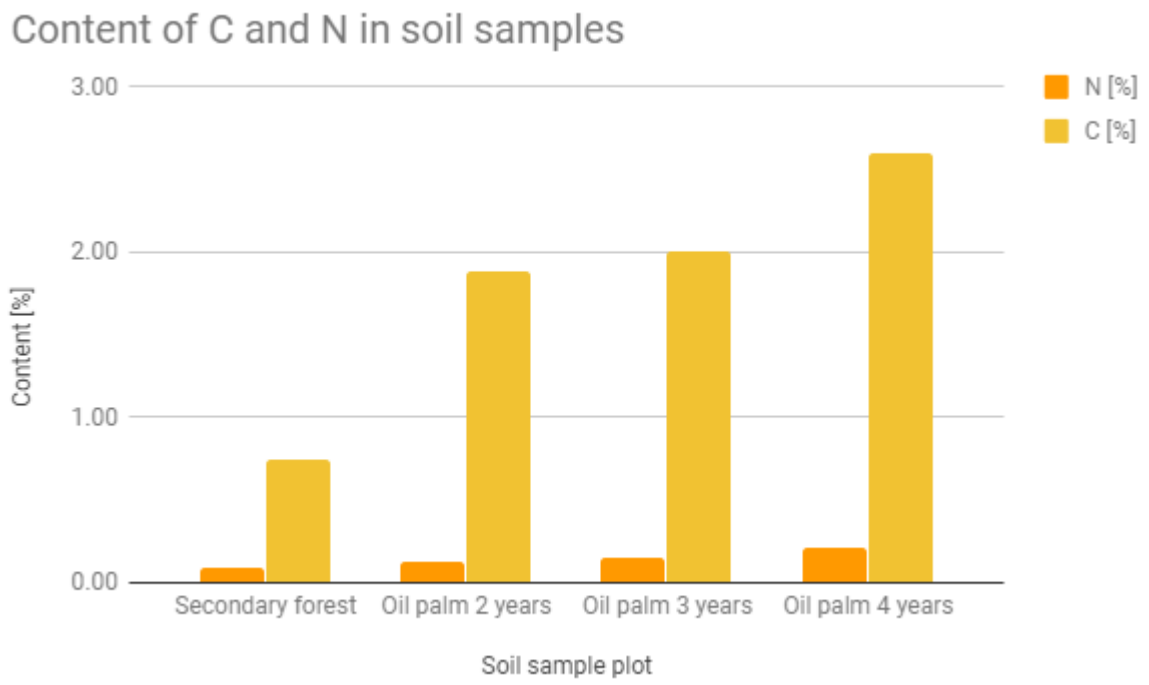

Figure 19: Content of C and N in soil samples

The soil analysis for the four sample plots showed that the content of C is drastically higher for the young OP than for SF (Figure 19). With rising OP age, we see a slight increase. N increases slightly but steady after converting to OP, probably due to the application of fertiliser. We expected a decline in the C content, but our results opposed this, possibly due to the bits of charcoal from previous burning that were found in some samples, but excluded from the lab analysis. If we had taken these same samples from

older trees, this charcoal might have already decomposed, adding carbon to the soil. This might explain the documented increase of C in the soil over time.

Soil sample results					
Sample plot	N [%]	C [%]	C:N	SOM %	pH
SF	0.09	0.75	8.33	1.29	4.11
OP2	0.13	1.88	14.46	3.23	3.82
OP3	0.15	2.00	13.33	3.44	3.91
OP4	0.21	2.60	12.38	4.47	3.92

Table 3: Soil sample results

The C:N ratio is dramatically higher on the SF than on the two year OP (Table 3). However, the ratio decreases steadily with the age. This was not expected, but due to the increase in C content, the C:N ratio in our samples decreases over time.

SOM follows the pattern of C and N and is overall higher in the OP plots than the SF plot, with a drastic difference between SF and OP2 plots. The following years (OP3, OP4), the amount of SOM in the soil is more steady.

Soil in the area can be acidic (FAO, 1974; 1976). Our analysis also indicates this, as the soil at the SF has a pH at 4.11. According to Comte et al. (2013) soil becomes more acidic with application of fertiliser. Our results support this as soil pH is 0.3 % lower on the SF plot than the two-year OP plot. In the older plots the pH is slightly higher by approximately 0.1 %, but is generally at a steady level of ～3.9 %.

According to Guillaume et al. (2016), degradation of soils over time can be expected with intensive management. However, because our samples were taken from a newly cultivated field, the results show the opposite, that is, continuous application of fertilisers for a few years caused nutrient accumulation in the soil.

Despite our attempt to find plots with the same management practices, overall, the selection of sample sites was not ideal. The soil types were more heterogeneous than expected, and the small age range of OP meant that even with equal soil types, no discernible differences could have been expected. If a greater age-range of trees had been sampled, the results might have shown greater change over time.

Most SSOP is still in the preliminary stages of cultivation, therefore effects on soil quality from non-shifting practices are still unknown. Though the results obtained are affected by fallacies in the method design, this method gave us an opportunity to approach our research aims from a natural science perspective. From the field data gathered, we cannot conclude that oil palm degrades the soil over time, and thus cannot make any sound inferences about the ecological viability of SSOP as a long-term perspective livelihood strategy.

5.0 Discussion

5.1 Diversification Vs. Specialisation: The Effect on Vulnerability

"Growing oil palm does not exactly make life better,
but after the introduction phase, life is definitely easier" (SSOP FGD)

Increased market access has facilitated villager involvement in monetary economies, incentivising them to adopt a portfolio of income-generating activities. In particular, SSOP cultivation is seen as a desirable activity which provides stable income and employment throughout the year (Cramb and Sujang 2013). Cultivators have prospered from SSOP due to relatively high market prices, while also non-SSOP households benefit from increased employment opportunities. However, SSOP demands sizeable initial investment, which prevents households with insufficient capital from joining SSOP cultivation, reducing their potential for upward mobility. Meanwhile, SSOP farmers that increase profits through expansion or improved OP yields could also increase income disparity in the village.

Despite the start-up costs, SSOP is commonly regarded as a smart, long-term investment in financial stability. SSOP cultivators are seen as thriving members of society, with pick-up trucks as the symbol of their purchasing power. Profitability of SSOP is recognised by all households, generating a sense of competition between villagers and causing non-SSOP households to feel some to feel social pressure to join "the bandwagon." These households, along with those who recently started cultivating SSOP, perceive OP as a potential for poverty alleviation. In interviews, non-SSOP households expressed a desire to focus only on SSOP if they could; therefore just the prospect, not the practice, of SSOP reduces their motive to maintain a diverse portfolio of activities.

Yet in reality, a majority of new SSOP growers and non-SSOP growers are still cultivating subsistence and cash crops combined with off-farm activities. We observed that while experienced SSOP growers often prioritise SSOP, they often do not abandon other activities, indicating that SSOP cultivators maintain diverse livelihood portfolios despite the relative profitability of SSOP compared to other opportunities. These findings are consistent with a similar study conducted in Sarawak, which reports that SSOP cultivators maintain diversified livelihood portfolios "in which non-farm sources of income...feature prominently" (Cramb and Sujang, 2013).

Perhaps those who are just starting to cope with the steep start-up costs of OP cultivation maintain diverse income-generating activities out of necessity; as more households reach the stage of OP harvesting, we might see households with greater room for manoeuvre and therefore more specialisation through expansion of land

under SSOP, and greater prioritisation of labour to SSOP. Such developments could also cause greater specialisation on a landscape level, as a majority of households already cultivating SSOP expressed a desire to expand in the future. Expansion implies the sacrifice of existing cropland or the recultivation of fallow land. However, these processes do not necessarily require specialisation on a livelihood level. In the near future, households could either maintain current levels of livelihood diversity, rather than diversifying further by adopting more activities, or decide to specialise by allocating more considerable amounts of capital to SSOP. As a long-term perspective livelihood strategy, SSOP is an investment to increase stable income generation in the future. By investing in SSOP, but still maintaining a diverse livelihood portfolio, households are improving their ability to adapt to changing structures, reducing their vulnerability.

5.2 The Small-Scale Perspective

"Growing my own oil palm is hard work, but at least - this way - all the money goes to me. That makes it all worth it." - QUE (comparison with JVC)

Borneo is one of the last frontiers in Malaysia for OP expansion, and thus the area has seen enormous growth in private OP plantations, covering over 1 million ha (Cramb and Sujang 2013). The Sarawak government has traditionally excluded independent smallholders in its development policies by placing rural poverty alleviation in the hands of private industries, promoting land-consolidation through JVCs (Andersen, 2016). In Menangkin, such policies affect independent SSOP producers' access to the OP industry. Barriers include deteriorating infrastructure, difficulty obtaining credit for OP start-up capital, limited bargaining power at the mill, lack of input subsidies, and limited access to market and agronomic information resources. One similar study in Sabah finds these factors as experienced by smallholder OP farmers; in addition, the literature reports that many smallholders struggled to obtain legal titles to their land. Unfortunately, the issues surrounding indigenous communities and land ownership in Sarawak are complex, as local land tenure systems are multi-faceted and ambiguous (Martin et al., 2015). This challenge of SSOP cultivation is outside the scope of our investigation and was intentionally neglected.

Independent smallholders are also generally absent in the international discourse surrounding the Malaysian OP industry, which highlights the controversial social and ecological consequences of the industry's rapid growth in the last quarter century. Some of the problems associated with the increased demand for palm oil include mass-deforestation of tropical rainforests, reduced biodiversity, and displacement or exploitation of indigenous communities. These disastrous effects have attracted the attention of the public and civil society organisations, which put pressure on the OP industry to adopt more sustainable practices (Oosterveer 2015). However, there are minimal efforts to include SSOP cultivators in these ecological initiatives (Martin et al., 2015).

5.3 Discussion of methods

Employing qualitative methods with multiple informants and researchers can cause discrepancies in results. Slightly different ways of asking and answering questions across subjects cause inconsistencies, and different levels of knowledge amongst informants mean different levels of accuracy on different topics.

For example, quantitative questions on broad subjects generated responses with inconsistent units, preventing proper analysis and comparisons without inaccurate conversions. For example, owning "a lot of land" was loosely interpreted as more than 5 ha of land, based only on intuition, risking misinterpretation.

Some data gaps have prevented thorough analysis, mainly due to errors in method design. For example, if questionnaires included education level of all household members, not only the respondent, the estimation of human capital in the household would be more accurate. Furthermore, more information on remittances could have improved understandings of the relationship between rural-urban linkages and livelihood strategies.

Miscommunication between members of the research group in the field also caused data shortcomings. For example, the participants of the two focus groups were mistakenly invited at the same time, before activity planning was finished. Therefore, the facilitators had to improvise without proper question preparation. As a result, important questions were omitted about villager motivations to cultivate SSOP. Furthermore, having two simultaneous FGDs was uncomfortable, as it became obvious that we split the more wealthy people (SSOP) from the poorer ones (non-SSOP), which may have influenced discussion participation and thus data quality.

Analysing incomplete data requires making assumptions and estimates, and therefore results should not be seen as attempts to reproduce an absolute reality, but as our interpretation of reality from 12 days of fieldwork.

5.4 Group work and learning experiences

Our role in the village

When reflecting upon our role in the village, certain questions arise: Did our presence and work in the village affect villager's perspectives? In the non-SSOP focus group, for example, all agreed on a social pressure to start cultivating SSOP. Our presence and focus on exactly SSOP may have increased the feeling of social pressure by the non-SSOP cultivators, and we should not be ignorant to the impact to which our presence may have contributed.

Group work

In our research we collaborated closely with a group of 6 students from the UNIMAS, Malaysia. In the field, it proved challenging at times to effectively organise activities that

included the interests and skills of 10 people, along with 2 interpreters. At times, communication in the group was difficult due to differences in native languages, and/or understanding of purpose or details of the activity. At times it was exhausting to find a compromise between so many people, but most of the time we found that if we split into smaller groups, we could work more efficiently. Overall, it was rewarding to collaborate with such a diverse group in terms of nationality and academic background; intense group work in foreign living conditions provides a unique learning opportunity to exercise cultural fluency and benefit from diverse perspectives. For example, many students at UNIMAS did not see studying OP as particularly interesting, whereas the University of Copenhagen students saw the project as a chance to explore a current controversial subject in the West. By exchanging our viewpoints on the subject, each sub-group developed more nuanced understandings of how SSOP was regarded by both Malaysians and the international community. Such were the benefits of cross-cultural group work, which overall led to a more critical analysis of village livelihoods.

6.0 Conclusion

In observing how households with different access to capitals pursue different livelihood strategies, one important question arises: How does the emergence of OP in the area affect these livelihoods? While some villagers have enough pre-existing capital to profit from this development, some must do with supporting the rising prosperity of others through OP-associated activities such as wage-labour on others' OP. This arguably raises the general level of wealth in the village, but also creates greater income disparities. Therefore, a principle area for policy improvement is the development of programs for government and organisational assistance for OP smallholders in the form of input subsidies, land-clearing assistance, agronomic advisors, and improvement of road networks to lower the cost of transporting FFB to the market. Such changes would help poorer households overcome barriers of limited capital, creating more equitable access to SSOP as an income-generating activity.

SSOP is currently the most attractive agricultural investment for villagers in Menangkin, yet that does not mean it is undertaken to replace other livelihood activities. Households cultivating SSOP are not engaged in fewer livelihood activities than households not cultivating SSOP. In essence, the concept of livelihood specialisation was not observed in practice, but only as a desire expressed by those without experience harvesting (and thus profiting from) SSOP. The wish to focus exclusively on SSOP arises from the perception of SSOP as the most effective solution for improving household income. These trends indicate that villagers in Menangkin with sufficient resources are adopting SSOP cultivation as a long-term livelihood strategy. Meanwhile, those without the necessary capital partake in OP-related jobs as short-term strategies. Both engage in

these activities to reduce vulnerability, yet without reducing the diversity of their livelihood portfolios.

Through assessing village livelihoods and determinants of cultivating SSOP in Menangkin, this report has examined some of the challenges and opportunities facing independent SSOP-cultivating households, exploring the perspectives of villagers impacted by the growth of the OP industry in their area over the last 10-20 years. One of the most salient lessons learned through speaking to villagers is how the cultivation of OP has a real stake in whether a household could have enough food to eat, send their children to school, or afford basic medical services. Through listening to the personal anecdotes of people participating in the OP industry, we can critically examine the two most prevalent perceptions of the commodity: OP as the key to rural development, as promoted by state and private entities, and OP as a socially and ecologically problematic cash crop, as perpetuated by the international community. Given the relative obscurity of independent smallholders in these two narratives, it is important that the impacts of OP on rural livelihoods are examined in both the public sphere and policy considerations. By exploring the smallholder perspective, we can bridge the gap between these two perceptions of the palm oil industry, and contribute the voices of Menangkin to the global conversation.

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Appendix

List of appendices:

I - Questionnaire

Menangkin Village Questionnaire

General Information:

1.

Interviewer:	Interpreter:
GPS-points: x:_____ y:_____ z:_____	Date/Time:
Village:	Note-Taker:

2. Name: _____

3. (Head of HH): _____

4. Gender: M / F

5. Age: 1= **under 18**: ____ 2= **18-29**: _____ 3= **30-49**:_____ 4= **50-69**_____ 5= **+70**_____

6. Household Status of Respondent: ____

1 = Head of HH
2 = Wife/husband of head of HH
3 = Adult from HH
4 = child (under 18)

7. What is your highest level of a completed formal education? ____

1 = No schooling
2 = No formal schooling/incomplete but can read/write
3 = Primary school
4 = Secondary school
5 = Higher level (STPM/diploma/degree) completed
6 = Technical/Vocational training (agriculture, welding, other)

8. Were you born in this village? (0 = No 1 = Yes) ____

9. How many people belong to your household (incl. you)?

Status	Age	Occupation(s)	Contributes to HH income?

10. How many of these people were present for more than **2 weeks** in the last **month?** ____

Employment/Income

12. How many persons in your household are/were working **outside this village** in the last year **(2017/2018)**? _____

13. Have the following income activities contributed to your household's overall income in the past year **(2017/2018)**? (0 = No, 1 = Yes)

13.0 Production/sale of cash crops		13.5 Regular salary labour	
13.1 Agricultural wage labour		13.6 Remittances	
13.2 Non-Agricultural wage labour		13.7 Driver	
13.3 Sale of livestock/animal products		13.8 Self-employed (service, selling handicrafts, cooking etc.)	
13.4 Renting out machinery/vehicles		13.9 Renting out land (dividends)	

Agriculture:

14. Do you have any agricultural land for cultivation? (0=No 1=Yes) ____

15. How do you access this land? *(Note all that apply)*

1 = Private Ownership
2 = Rented
3 = Crop-shared (co-owned)
4 = Leased to others
5 = Other:_____

16. What is the total size of the agricultural land? (in hectares) _____ ha
OR _____ no. of trees

17. How much of that agricultural land has been cultivated in **2017/2018?** _____ ha OR _____% *(Either ha or proportions)*

18.

a. What crops have your household cultivated in the past year **2017/2018**? (see options: 0 = No 1 = Yes)

b. What is/has been the **main use** of this past year's harvest?
(1 = HH Consumption, 2 = Market, 3 = No use/damaged, 4 = fodder)

c. How much did you produce in this last year **2017/2018**?

Crop	Cultivated (a)	Use (b)	Quantity/year (c)
18.0 Oil Palm			
18.1 Rubber			
18.2 Pepper			
18.3 Rice			
18.4 Jackfruit			
18.5 Durian			
18.6 Vegetables			
18.7 Pineapples			
18.8 Cocoa			
18.9 Other			

IF THEY CULTIVATE OIL PALM:

19. Do you have an oil palm license? (1=yes, 0=no) _____

20. On about how much land do you grow oil palm? _____units

21. For how long have you cultivated oil palm? _____ years

22. How do you manage your oil palm land?

1) you manage it within your HH (only family members work the land)

2) you manage it with hired labour

3) JVC (you only receive dividends)

4) mixed practices (part JVC, part private, or part-private, part hired labour, etc)
Write here:_____

23. From the year 2014 to 2017, which year has the highest market price?_____

24. From the year 2014 to 2017, which year has the lowest market price?_____

25. What are your main challenges with cultivating oil palm here*? (have note taker write down)*

Agriculture Management

26. Do you receive agriculture input subsidies (fertilizers, pesticides, seeds, other)? (1=yes, 0=no)

a) Fertilizers _____ amount (a year)_____

b) Pesticides _____ amount (a year)_____

c) Seed materials _____ amount (a year)_____

d) Other (name) _____ amount (a year)_____

27. What kind of agriculture inputs do you use? *(note all that apply*)

Inputs	Used? (1=yes, 0=no)	Total price/unit	Total quantity per year
27.1 Fertilizers			
27.2 Pesticides			
27.3 Organic (manure/compost)			
27.4 Seedlings			

Market access

28.Do you sell agricultural land products on the market?

1=yes 0=no

29.How many times do you sell your products at the market on average each month?

1) 1

2) 2-5

3) >5

30.Which vehicle do you use to transport various products to market? (private small car, private large truck, private pick-up truck, private motorcycle, friend's vehicle, middle-man, other)

Transport	Used? (1=yes, 0=no)	For what products? *List crops, other*
30.0 Your motorcycle		
30.1 Your car		

30.2 Your Large truck (Lorry)		
30.3 Your pick-up truck (Hilux)		
30.4 Friend's motorcycle		
30.5 Friend's car		
30.6 Friend's Large truck (Lorry)		
30.7 Friend's pick-up truck (hilux)		
30.8 Middle-man		
30.9 Other		

31. If you use your own or a friend's car, truck, pick-up truck or motorcycle, what are the cost of (a)petrol for one trip and (b)annual cost to repair vehicles because of road conditions?

1. a) Motorcycle (petrol) _____ b) Repair costs _____
2. a) Car (petrol) _____ b) Repair costs _____
3. a) Pick up truck (petrol) _____ b) Repair costs _____
4. a) Truck (petrol) _____ b) Repair costs _____

32. If you use middelmen to sell various products, how often each month?

1) 1

2) 2-5

3) >5

33. How much do the middlemen charge for their service? *(for specifics → note taker)*

_____

34.List reasons for using or not using middlemen (*note key words*).

_____

35. On a scale from 1-4, how do weather conditions affect your access to markets?
(take notes if they elaborate on how they are affected)

1. Very affected
2. Affected
3. Slightly affected
4. Not affected at all

36. On a scale from 1-3, how would you rank the price stability (how much the price changes) of each of your cash crops in the last year?

1) very stable (no changes)
2) somewhat stable (some small changes, around 10 RM increase/decrease)
3) not stable (price has dropped or risen multiple times, or changed more than 10 RM in the last year)

Crop (if applicable):
a) Oil Palm _____
b) Pepper _____
c) Rubber_____
d) Pineapple_____
e) Coconut_____
f) Other _____

Food Consumption

37. About what percentage of **the foods** you eat every day is purchased at the market or traded? _____

1 = ~25% 2 = ~50% 3 = ~75% 4 = ~100%

38. Have these proportions (amount of food bought vs. amount of food grown) changed dramatically over the last 10 years? (0=No 1=Yes) ____

Natural Resource Products

39. Do you collect natural resource products? (0=No 1=Yes) _____

40. If yes, for which purpose? *Note all that apply* _____

1 = Gathering edible plants
2 = Hunting/Fishing
3 = Medicine
4 = Source of raw materials
5 = Ritual purpose
6 = Fuel wood
7 = Fodder
8 = Other (specify)_____

II - Table of applied methods

Overview of Applied Methods	
Method	**No. of Participants**
Questionnaire	21 villagers, 21 households visited
SSI	5 villagers, 5 separate interviews
FGD	2 separate groups, about 12 total participants
PRA - ranking, mapping and seasonal calendar	3 groups in 3 separate activities, 5-7 village participants each
Transect trip	4 researchers, 1 village guide
Participatory Observation - fishing, OP harvesting and rice harvesting	3 researchers, 7-8 villagers total, 3 separate excursions (fishing/gathering, harvesting oil palm, harvesting paddy)
Soil Sampling	4 researchers, 1 village guide, 16 total samples collected
GPS Measurement	2 researchers

III - Overview of OP cultivating villagers

HH's included in the questionnaire: 1, 2, 3, 6, 9, 10, 12, 13, 14, 17, 18, 19, 20, 21, 23, 26, 28, 27, 31, 30, 32

SSOP cultivators		Non-SSOP cultivators		
SSOP	SSOP & JVC	JVC	Planning SSOP	No SSOP or JVC
01: Anthony 06: Keloni 09: Gelen 12: Lucas 19: Jinggan 21: Menggie 23: Nyegang 30: Jenny 32: TR Galang	10: Jugah 13: Linggie 17: Sandin 18: Tinggang 26: Alexander	14: Mengie	02: Elis	03: Nero 20: Bid 31: James

SSOP cultivators	
Experienced (≥4 years)	New (<4 years)
01: Anthony 06: Keloni 09: Gelen 18: Tinggang 19: Jinggan 21: Menggie 26: Alexander 27: Untan 32: TR Galang	10: Jugah 12: Lucas 13: Linggie 17: Sandin 23: Nyegang 30: Jenny

IV - Motivations and constraints to grow SSOP

Table X: Villager perspectives on motivations and constraints to grow SSOP; citations and categorizations.

Motivations to grow SSOP		**Constraints to grow SSOP**	
"OP is a stable source of income, even if market prices drop, because you harvest 2x a month and you have to buy food regularly - so it makes sense to have a stable source of money" (QUE HH02)	Stable income	"No subsidies, and have to weigh the cost up start-up inputs to SSOP against the cost of food" (Non-SSOP FGD HH02)	Lacking financial start-up capital
"OP requires a lot of hard work in the beginning, but the harvest makes it worth it. OP has changed the lives of people here, especially for those who grow a lot of it. " (SSI HH09)	Long term capital accumulation + increasing welfare	"If I had more years ahead of me, I would only cultivate OP. I would expand by burning more fallow land" - constrained by age, as OP is a long-term investment (SSI HH09)	Old age
Non-SSOP cultivators feel a social pressure to start	Social pressure to	Money and labour are the main limiting	Lacking financial

cultivating OP (Agreement in non-SSOP FGD)		factors when beginning SSOP, along with age (Agreement in non-SSOP FGD)	capital, lacking labour power, old age
Headman is planning to expand SSOP cultivation. He would rather have the profit from OP on his fallowlands than leave it fallow (SSI Headman)	Opportunity for capital accumulation	"Money- and land constraints are reasons why more villagers don't plant OP." (SSI Headman)	Lacking financial capital, lacking land
"The motivation to start cultivate OP was out of passion; because it requires little maintenance as soon as it has grown to a certain size; to support school for her children, and because a lot of people in the village earned a lot of money from OP." (QUE HH30)	Less labour demanding crop, need for money	"If you are not strong enough, physically and mentally, you cannot grow OP, because you need to be able to both keep and maintain it" (QUE HH30)	Hard work physically and mentally
"Working in my in-laws' OP fields, I saw they were getting more regular income than JVC. That inspired me to start my own private OP cultivation" (HH10)	Inspiration from social network	"The hard work is not a problem, but my land is infertile, and I don't have the money to buy enough inputs to get started" (HH10)	Lacking financial start-up capital
Comparing OP with pepper: "OP is like a grown-up and pepper is like a baby. As soon as OP has grown to a certain size, it can sustain itself, it will not die, even if you do not fertilize it. Pepper, on the other hand, requires a lot of maintenance all the time, otherwise it will die". (SSOP FGD)	Less labour demanding crop	The main challenge is the get enough input in the start-up phase, because fertilizers are very important for young trees (SSOP FGD)	Lacking financial start-up capital

V - PRA ranking on labour prioritization

VI - PRA ranking - participants

VII - Seasonal calendar

VIII - Sample results for EC; soil colour; soil texture; density and pH

Soil samples - electric conductivity, pH, density, texture and colour					
	Ec [mS/cm]	Colour	Texture	Bulk density (fresh weight) [g/cm^3]	pH
SF	9.34	Yellow'ish brown	Clay loam	1.89	4.11
	9.17			1.86	4.10
				1.80	
Average	**9.26**			**1.85**	**4.11**
OP2	44.50	Very dark brown	Sandy clay loam	1.91	3.80
	43.20			1.48	3.84
				1.78	
Average	**43.85**			**1.72**	**3.82**
OP3	9.92	Brown	Sandy loam	1.51	3.91
	9.96			1.53	3.90
				1.49	
Average	**9.94**			**1.51**	**3.91**
OP4	12.84	Dark brown	Sandy clay loam	1.57	3.91
	15.23			1.62	3.92
				1.40	
Average	**14.04**			**1.53**	**3.92**

IX - Sample results for C and N content

Soil samples - C and N content							
Sample	Weight [mg]	N %	C %	Median N [%]	Median C [%]	C:N (median)	SOM % (median)
SF1	100.7	0.11	0.84	0.09	0.75	8.3	1.3
SF2	100.7	0.09	0.63				
SF3	100	0.08	0.75				
OP2-1	100.6	0.08	0.96	0.13	1.88	14.5	3.2
OP2-2	99.8	0.22	4.1				
OP2-3	100.5	0.13	1.88				
OP3-1	99.4	0.15	2.21	0.15	2	13.3	3.4
OP3-2	99.1	0.09	0.75				
OP3-3	100.3	0.15	2				
OP4-1	99.7	0.22	3.23	0.21	2.6	12.4	4.5
OP4-2	99.5	0.21	2.6				
OP4-3	99.7	0.14	1.9				

X - Synopsis

ILUNRM 2018

Research Project Synopsis

Menangkin Village

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Submitted February 23rd 2018

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1. Introduction

Research Framework:

Sarawak is a state of about 120,000 km^2 in the northwestern part of the island of Borneo, with about 2,630,000 inhabitants of mixed ethnicities. About 45% of the population is *Dayak*, the government classification of the indigenous inhabitants of Sarawak, consisting of the Iban, Bidayuh, and Orang Ulu sub-ethnic groups (Ichikawa, 2007). This research project focuses on the livelihoods of rural Iban villagers, who have traditionally cultivated the tropical rainforest land in subsistence-based communities.

However, rapid economic development in Sarawak over the 20th century saw the introduction and integration of cash crop production with the traditional subsistence swidden methods used by the Iban. Before the period of British colonization (the Brooke regime) that began in the 19th century, the primary forest was utilised by indigenous people through shifting cultivation practices. Increasing forest development throughout the Brooke regime and during the British occupation after World War II saw greater exploitation of natural resource capital and land-intensive cash crop cultivation (Wadley and Mertz., 2005). Although rubber was introduced in the early 20th century as a valuable market product, cash-cropping did not really "take off" until the later decades of the 20th century with the introduction of pepper and oil palm (Wilms-Posen, 2014). Through the aid of the newly-independent Malaysian government, small-holder cultivation of these crops and private, large-scale plantations quickly expanded. The growth of plantations has also facilitated the construction of transportation infrastructure in rural areas, creating greater market access for previously isolated communities. These economic trends, coupled with increasing urbanization, commercial logging, and wage-labour activities, caused dramatic land use changes in Sarawak (Kato, 2014).

The degree to which these activities either were integrated with, or replaced, traditional shifting cultivation tactics varies among villages. Some case studies of the Iban in Sarawak report practices of alternating between cash crops based on fluctuating market prices, and use of swidden rice cultivation as a "buffer" to maximize production and

income in different years (Mertz et al., 2013; Cramb, 1993). Overall, research suggests a general decline in the traditional cultivation practices of Iban villagers. Generally, it has been reported that the relatively steady price of palm oil has incentivized increasingly singular production of oil palm plantations (Mertz et al., 2013).

Research Focus:
We seek to investigate the evolving role of agriculture as a component of village livelihoods in rural Sarawak, Malaysia. With ever-increasing rural-urban connectivity, coupled with large-scale plantation expansion, villagers have greater access to global markets and monetized income opportunities. In addition, the establishment of nearby Mount Lingga National Park, while potentially limiting access to the area's natural resources, also might provide opportunities for off-farm income, such as tourism. However, such changes can also cause the decline or disappearance of long-held Iban livelihood traditions. Evaluating recent transformations in agricultural land use, along with evolving village livelihoods, can indicate the effects of rural economic development on the livelihood vulnerability and cultural identity of Iban villagers.

Our study area, Menangkin, is an Iban village located about 28 km from Pantu bazaar, in the Kuching district of Sarawak. Menangkin is home to about 30 households, under the leadership of TR Galang and TR Jinggan. A third headman, the brother of TR Galang, is responsible for 10 of the houses, which are located in a splinter village called Lalau. This smaller village was established 6-8 years ago to provide some villagers with more land to cultivate cash crops and greater access to major road networks. Our research will concern these transitions in village agricultural land use while examining shifting natural-resource based livelihood strategies in Menangkin. The following objectives and research questions further specify our aims for this study.

2. Objective and Research Questions

Overall Objective and Research Question:

Investigate the community natural-resource based livelihood strategies in relation to land use in the village of Menangkin, Malaysia. How has the role of agriculture changed with increasing rural-urban linkages in Sarawak?

Research Questions:

1. How important are subsistence agriculture practices (including shifting cultivation) to maintaining rural livelihoods?
    1.1 How is labour prioritized and allocated between subsistence and cash crop production?
    1.2 What is the balance between imported (bought) and self-grown food consumption?

2. What are the factors that determine the cultivation and diversification (or abandonment) of certain cash crops?

2.1 Does soil quality affect crop diversification, or the decision to plant cash crops vs subsistence crops?

3. How have changing agricultural input/output markets affected community land use?

3.1. How have the markets changed (ex. in the last decade)?
3.2. What are the various agriculture inputs/outputs?

4. How does infrastructure influence rural-urban linkages and access to markets?

4.1 Does improved infrastructure contribute to better livelihoods in the villages?

5. What role do various natural resource products and off-farm activities have in village livelihoods?

5.1 What are the contributions of natural resource products to sustaining village livelihoods?
5.2 What are the contributions of off-farm activities?

3. Methodology

3.1 - Concepts and Theory

For this field project, our work will take a theoretical point of departure in the Sustainable Livelihood Framework by DFID (1999) (see appendix II), also described by Ellis (2000) and Scoones (2009). The framework includes ***assets***, divided into five capitals; human, natural, financial, physical and social, which can be explored by household level. Access to assets are modified by ***transforming structures and processes***, including social relations, institutions and organizations, in a ***vulnerability context*** of trends and shocks. Together these have impact on the possible ***livelihood strategies*** that arise for a household to achieve certain ***livelihood outcomes***, such as more income, increased well-being, improved food security or more sustainable use of natural resource-based assets (DFID, 1999; Ellis, 2000; Scoones, 2009).

In our project, we aim to map the assets available in the village and in different households, initially focusing primarily on natural resource-based assets, but not neglecting the others in our fieldwork and analysis. Further, we will investigate the structures and processes that have been or are changing, and try to assess their impact on the vulnerability context of the villagers, and how they impact the livelihood strategies.

3.2 - Data Required

<u>Getting access to data and informants:</u>

The required data needed for our final report will mainly be collected Menangkin and depending on availability, in Lalau. Some of our initial key informants will be the headmen of Menangkin; TR Galang and TR Jinggan, and possibly the TR in Lalau. The

headmen will be able to help us with contacting the relevant villagers, but we have to be aware that we contact with the right informants and not just the headmen's closest relatives. Thus, is it important to initially make a good impression on the villagers so we will have more potential sources of information. However, it is also important to keep in mind not to undermine the authority of the TRs' in the villages by not going to them in the first place. This will be something to be considered on site, since it is difficult to know in advance how the hierarchy works in each village. We also plan to have flexible time in the evenings to have informal talks with villagers, as that is the time where they will probably be the most available to speak with us.

Relevant data needed:
The fieldwork schedule and the data matrix are tools that will provide us with the right knowledge on each topic and research method we want to apply. These will be the foundation for our collecting of data, and are thus very important tools.
To make a visual overview of the villages and the surrounding areas, orthophotos will be a practical tool that will help us providing this.

3.3 - Proposed Methods

If implemented correctly, the following methods are viable tools to collect data and to create thorough knowledge on certain topics. The different methods are not meant to cover a topic solely, but will be a part of the data collection. Each method will in some cases also cover several topics related to our research questions.

Social Science Methods

Transect walk:
We will try to find a guide within the first days of our stay and take a tour of the village. On this walk we will aim to observe the different areas of cultivated land, what is being cultivated, and the method of cultivation. These observations will hopefully provide us with a sense of the crop diversification within the village and community land use. On the walk, we will also hopefully observe the extent and quality of village infrastructure, such as roads, houses and other built structures. We can also assess the availability and abundance of various natural resources within and surrounding the village.

Questionnaire:
Within the first few days of our fieldwork, we will employ a questionnaire to village households. We will attempt to use a random sampling of respondents in order to attain a representative sample with at least 30 respondents. The questionnaire will include Menangkin villagers, and depending on accessibility, also Lalau, and if so, ask participants to specify which village they are from. At this time, the method of randomisation has not yet been determined. The data from the questionnaire will be used to help identify key informants for further qualitative data collection (PRA, focus groups, semi-structured interviews). Questions will focus on subsistence agriculture practices, cash-crop practices, agricultural input/output markets, and use of natural resource products.

PRA - crop calendar, mapping (inputs/outputs), ranking:
PRA methods will be employed based on the nature of qualitative data we would like to obtain. For example, in order to assess how labour is prioritized and allocated between subsistence and cash crop production, as well as the balance between land allocated for each purpose, PRA ranking and seasonal calendar activities will be used. At this time, we do not have a clear idea of how the participants will be selected or invited. Other data that can be obtained through PRA includes mapping agriculture input and output flows in order to see how shifting markets, and increasing access to markets, affects community land use.

Semi-structured interview:
Semi-structured interviews will be used to obtain qualitative data on villager perspectives concerning several of our research questions. These interviews will be especially helpful in understanding the ties of subsistence products/practices to cultural identity, or how increased market access has affected the decisions of villagers to plant specific crops. Such information will also help us understand on a broader level how villagers utilise different natural resources in their daily lives.

Participatory observation:
Similar to the semi-structured interviews, participatory observation will be helpful in obtaining qualitative data concerning the villagers' perspectives, as well as an inside-look into the factors that contribute to village livelihoods. Through joining villagers in daily tasks, we hope to better understand the role of natural resource products in everyday village life. In addition, we could observe how labour is allocated between different tasks, and what activities are prioritised. This information could help us triangulate data we gather through other methods, such as PRA.

Focus group interview:
A group discussion could potentially provide valuable data on villager perspectives covering several of our research questions. As villagers often need to collaborate in order to access distant markets/bazaars, it would be interesting to assess group perspectives on shifting agriculture input/output markets, increases in access, and how this has affected village agricultural practices. Participants in the focus group will be identified after the questionnaire.

Natural Science Methods

Soil sampling:
We want to look into whether the quality of the soil has an influence on the choice of cash crops. Samples will be taken from both the areas with cash crops and the areas with subsistence crops (and both if they are mixed). The samples will be handled in the lab at UCPH, which will provide us with information on nutrient content, pH, conductivity (salinity), soil organic matter (SOM) and density. To stop microbial activity, it is important to dry the samples immediately after collecting them. Simple texture analysis will be carried out in the village.

Assessment of species diversity:
As we want to investigate the role of natural resources like NTFPs (non-timber forest products), an assessment of the diversity of plant species in the surrounding is relevant. Informants will be able to show us some of the places where they normally go to gather the products. Here we will make trial plots to assess the diversity in species. It is uncertain if the data will be something we are going to use, but a goal is also to try out how the method works in practice.

GPS area measurement:
Using the GPS to measure the area of the village and different areas of various cultivated and uncultivated lands will give us an objective view of how the village utilises land to sustain livelihoods. This will be valuable data when analysing and plotting in our data in the final stage of the project work.

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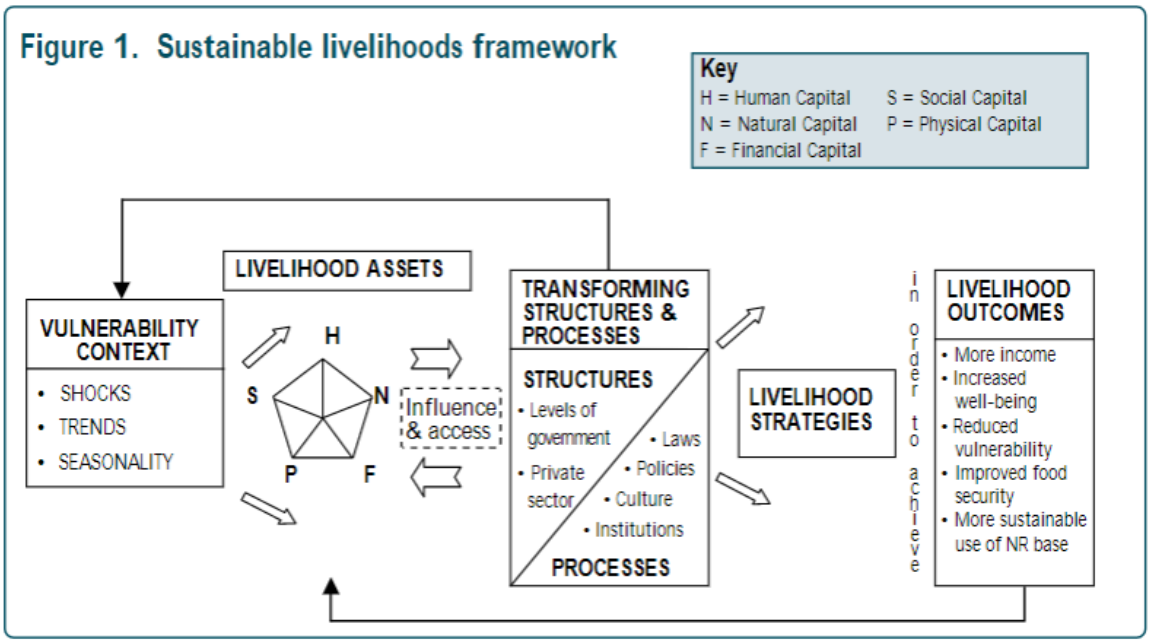
5. Appendix

I. Data Matrix

Overall Objective/Research Question	Research Tasks	Research Questions	Sub-questions	Data Required	Methods	Equipment needed
Investigate the community natural-resource based livelihood strategies in relation to land use in the village of Menangkin, Malaysia. How has the role of agriculture changed with increasing rural-urban linkages in Sarawak?	Map the existing natural resources in the village. Assess production, land use, and livelihood strategies in Menangkin. Evaluate land use diversification and socio-economic contribution of natural resources. Identify relevant organisational and institutional influence on livelihoods Identify changes in community land-use over time (including changes in cultivation practices).	How important are subsistence agriculture practices (including shifting cultivation) to maintaining rural livelihoods?	How is labour prioritized and allocated between subsistence and cash crop production? What is the balance between imported (bought) and self-grown food consumption?	Research papers with relevant case studies to understand local context Area of cultivated lands for each crop, documentation of cultivation method. Qualitative/quantitative data on villager perspectives.	GPS Area Measurement PRA-ranking, seasonal calendar Semi-structured interviews Questionnaire Transect walk	GPS; dictaphone; big paper/cardboard sheets; markers; pen paper
		What are the factors that determine the cultivation and diversification (or abandonment) of certain cash crops?	Does soil quality affect crop diversification, or the decision to plant cash crops vs. subsistence crops?	Soil samples of cash crop plots and subsistence crop plots Qualitative/ quantitative data on villager perspectives. Data on transportation of crops (cash and subsistence)	Questionnaire Semi-structured interviews Soil sampling Transect walk	GPS; Soil sampling equipment: volumetric rings, bags, markers, rubber hammer, measuring tape, piece of wood (shovel); pen, paper, dictaphone
		How have changing agricultural input/output markets affected community land use?	How have the markets changed (ex. the last decade)? What are the various agriculture inputs/outputs?	Qualitative and quantitative data on villager perspectives. Formal and informal information on land tenure system. Data on market prices. Data on transportation of crops to markets.	Focus group discussion Semi-structured interviews Literature review on land tenure system in area Questionnaire PRA mapping (input/output flows, transportation) Transect walk	GPS; Dictaphone; big paper/cardboard sheets; markers; pen; paper
		How does infrastructure influence rural-urban linkages and access to markets?	Does improved infrastructure contribute to better livelihoods in the villages?	Village mapping (including infrastructure). Qualitative data on villager perspectives. Quantitative data on use of roads, electricity, sanitation infrastructure, etc. Area measurement of roadside settlements. Qualitative data on Lalau perspectives.	PRA mapping (input/output flows, transportation) Semi-structured interviews, both in Lalau and Menangkin GPS Area Measurement Questionnaire Transect walk	GPS; dictaphone; big paper/cardboard sheets; markers; pen; paper
		What role do various natural resource products have in village livelihoods?	What are the contributions of natural resource products to sustaining village livelihoods? What are the contributions of off-farm activities?	Research papers with relevant case studies to understand local context, history, tourism. Qualitative/quantitative data on villager perspectives.	Questionnaire Semi-structured interviews Transect walk Participatory observation Biodiversity assessment	GPS; Pen, paper, dictaphone, biodiversity assessment materials (measuring stick?)

II. DFID Livelihood Framework



Source: DFID 1999

III. Collaboration with the UNIMAS student counter group

This project, together with the field work in Menangkin, is organised as a collaboration between students from the University of Copenhagen and University Malaysia Sarawak (UNIMAS). Collaboration with students from University Malaysia Sarawak will include the agreement on research objectives as well as research questions to some degree. Additionally, the aim is to apply same research methods to the study place. The fact that UNIMAS students hold different academic backgrounds will allow us to enhance and diversify our interdisciplinarity approaches to the research. We expect UNIMAS students to have better insights into Sarawak socio-economic, political and environmental contexts, which can contribute to our broader understanding of the livelihood dynamics in the area.

IV. Fieldwork Schedule

Part of preliminary fieldwork schedule:
Note: We are bringing a blank, laminated schedule with us to the field for easy modification. Below is a picture of the format we will use in the field.

Task(event)/day	Minimum number of group members needed	Informants needed	Mar 1st			Mar 2nd			Mar 3rd			Mar 4th			Mar 5th			Mar 6th			Mar 7th			Mar 8th			
			Morning	Afternoon	Evening	Morning	Afternoon	Evening	Morning	Afternoon	Evening	Morning	Afternoon	Evening	Morning	Afternoon	Evening	Morning	Afternoon	Evening	Morning	Afternoon	Evening	Morning	Afternoon	Evening	Morning
Questionnaire	all																	x	x		x	x					
PRA: seasonal calendar	2	TBD, interpreters							x																		
PRA: ranking	2	TBD, interpreters								x																	
PRA: mapping - input/output flows	2	TBD, interpreters										x															
Transect walk	all	Headman/Guide, interpreter				x	x																				
GPS area measurement	2														x	x											
Semi structured interview	2												x														
Soil sampling	2	Farmers, interpreters																						x	x		
Focus group interview	2	TBD, interpreters																									x
Participartory observation	all	villagers																									
Assessment of plant diversity	2																										
(Transcription of interviews)	1												x														
Group Meeting	all		x			x			x			x			x			x			x			x			x
Preparation for next day					x			x			x			x			x			x			x				

V. Draft Questionnaire

General Information:

Interviewer:	Transcriber:
GPS-points: x:_____ y:_____ z:_____	Date/Time:
Village:	Notes:

1. Name: _____

2. Gender: M: __ F: ___

3. Age: A:under 18: ____ B:18-30: _____ C: 30-50:____ D: 50+_____

4. Household Status of Respondent: ____

    1 = Head of HH
    2 = Spouse of head of HH
    3 = Adult male from HH
    4 = Adult female of HH
    5 = child (under 18)

5. What is your highest level of formal education? ____
    1 = No schooling
    2 = No formal schooling/incomplete but can read/write
    3 = Primary completed
    4 = Secondary completed
    5 = Higher completed

6 = Vocational training completed (agriculture, tech, other)

6. Were you born in this village? (0 = No 1 = Yes) ____

7. How many persons belong to your household (incl. you)?

a =none	b =0 - 4 yrs	c= 5 - 18 yrs	d=19 - 30 yrs	e=31 - 59 yrs	f= > 60 yrs	g=Total

7.1 Male						
7.2 Female						

8. How many of these people were present for more than **2 weeks** in the last **month?** ____

9. Do you **own** any of the following? (0 = No 1 = Yes)

9.0 Television		9.6 Bicycle	
9.1 Mobile Phone		9.7 Motorcycle/Scooter	
9.2 Refrigerator/Freezer		9.8 Agricultural machinery	
9.3 Satellite dish		9.9 Agricultural tools	
9.4 Bank Account		9.10 Water pump	
9.5 Livestock		9.11 Stove	

Agriculture:

10. Do you have any agricultural land for cultivation? (0=No 1=Yes) ____

11. How do you access this land? *(Note all that apply)*

1 = Private Ownership
2 = Rented
3 = Crop-shared (co-owned)
4 = Leased to others
5 = Other

12. What is the size of the agricultural land? (in hectares) _____ ha

13. How much of that agricultural land has been cultivated in **2017/2018?** _____ ha OR _____% *(Either proportions or ha)*

14. Has the land size cultivated **changed** compared to last year? _____

1 = increased
2 = decreased
3 = remained about the same

15.

a. What crops has your household cultivated in the past year **2017/2018**? (0 = No 1 = Yes)
b. What is/has been the **main use** of this past year's harvest?

(1 = HH Consumption, 2 = Market, 3 = No use/damaged, 4 = fodder)

Crop	Cultivated (a)	Use (b)	**Crop**	Cultivated (a)	Use (b)
15.0 Oil Palm			15.4 Vegetables		
15.1 Rubber			15.5 Fruits		
15.2 Pepper			15.6 Cacao		
15.3 Rice			15.7 Other		
15.8					
15.9					

Agriculture Management

16. What kind of agriculture inputs do you use? *(note all that apply*)

1 = organic fertilizers (compost, manure, etc)
2 = synthetic fertilizers
3 = pesticides (herbicides, insecticides, fungicides)
4 = none

17. Which of these do you use for (a) cash crops _____ and (b) subsistence crops____?

18.1 What are the factors that determine why you plant different **subsistence crops** in different areas?

1 = soil nutrient quality
2 = altitude
3 = distance to household/storage
4 = slope
5 = water availability

18.2 What are the factors that determine why you plant different **cash crops** in different areas?

1 = soil nutrient quality
2 = altitude
3 = distance to household/storage
4 = slope
5 = water availability

Employment/Income

19. How many **male** household members are/were contributing to the household income in the last year **(2017/2018)**? _____ (children included)

20. How many **female** household members are/were contributing to the household income in the last year **(2017/2018)**? _____ (children included)

21. How many persons in your household are/were working **outside this village** in the last year **(2017/2018)**? _____

22. How many persons in your household are/were working **outside Malaysia** in the last year **(2017/2018)**? _____

23. Have the following income activities contributed to your household's overall income in the past year **(2017/2018)**? (0 = No, 1 = Yes)

20.0 Production/sale of cash crops		20.5 Regular salary labour	
20.1 Agricultural wage labour		20.6 Remittances	
20.2 Non-Agricultural wage labour		20.7 Driver	
20.3 Sale of livestock/animal products		20.8 Renting out land/ag. machinery	
20.4 Renting out land/ag. machinery		20.9 Self-employed (service provider)	

Food Consumption

24. About what percentage of **the staple foods (rice, vegetables, fruits)** you eat every day is purchased at the market or traded? _____

1 = 0 - 20% 2 = 20 - 40% 3 = 40 - 60% 4 = 60 - 80% 5 = 80 - 100%

25. About what percentage of **the supplementary foods (spices, oils)** you eat every day is purchased at the market or traded? _____

1 = 0 - 20% 2 = 20 - 40% 3 = 40 - 60% 4 = 60 - 80% 5 = 80 - 100%

*26. About what percentage of **the staple foods (rice, vegetables, fruits)** you eat every day is grown, hunted, or foraged? _____

1 = 0 - 20% 2 = 20 - 40% 3 = 40 - 60% 4 = 60 - 80% 5 = 80 - 100%

*27. About what percentage of **the supplementary foods (spices, oils)** you eat every day is grown, hunted, or foraged? _____

1 = 0 - 20% 2 = 20 - 40% 3 = 40 - 60% 4 = 60 - 80% 5 = 80 - 100%

28. Have these proportions changed dramatically over the last 10 years? (0=No 1=Yes)
____

29. Where does your household mainly buy food or materials for consumption? _____

1 = daily market 2 = weekly market 3= street vendor 4 = supermarket/shop

Tourism

30. About how many tourists do you have in the village per week? _____
1 = 0, 2 = 1- 4, 3 = 6-10, 4 = 11-20, 5 = 21- 40, 6 = >40

31. Do you consider ecotourism as mostly positive(1) or negative(0) for your village? _____

Natural Resource Products

31. Do you collect natural resource products? (0=No 1=Yes) _____

32. If yes, for which purpose? *Note all that apply* _____

1 = Gathering edible plants
2 = Hunting
3 = Medicine
4 = Source of raw materials
5 = Ritual purpose
6 = Fuel wood
7 = Fodder
8 = Other (specify)