Thematic Course in Intedisciplinary Land Use and Natural Resource Management

From subsistence to commercial farming in Plasu, Malaysia

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Abstract

Plasu, located along the recently built Kabong-Selalang road in the state of Sarawak, Malaysia is a rural community which has recently embraced oil-palm schemes. This development drives poses new vulnerabilities to the livelihoods of these inhabitants. With a concentration on the farming strategies of Plasu farmers, the subsequent dietary habits of the community and how their social interactions are affected, the following work seeked to identify the changes in livelihood assets of farmers and the wider community, and the vulnerabilities and benefits, that come with commercialization in Plasu.

It was concluded that commercialization have not only brought vulnerabilities to Plasu, but also the community enjoys certain benefits. Oil palm plantations appear to be attractive because of their economic benefits, though the loss of plant and animal biodiversity is acknowledge. Diet has undergone a change in food source from mainly depending on crops/livestock and jungle to the market. This change in food pattern has especially occurred amongst the youth who eat more processed foods and have less wild-food knowledge compared to older generations. Traditional community customs, though not as highly reverend as before, still exist and play important roles in the social connectedness

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Introduction

In Malaysia, shifting cultivation for subsistence farming is still widely practiced in rural communities despite the economic growth and the move toward becoming a developed nation (Hansen and Mertz, 2003). According to Yaman and Mohd (2004) the government considers shifting cultivation as an obstacle towards becoming more developed. Hence permanent cropping schemes of various cash crops such as pepper, oil palm and rubber are promoted through subsidizes and other amenities. These development schemes have encouraged rural communities to shift from traditional subsistence farming to commercialized agriculture (Hansen, 2005).

Kampung Plasu, located along the recently built Kabong-Selalang road in the state of Sarawak, Malaysia, currently faces such phenomena. Prior to 1992 the area was only accessible by foot and boat, manoeuvring through the narrow peat-drained channels. Since the road constructions in 1993, different governmental-driven schemes for coconuts, pepper, sago and rubber have been embraced. The Sarawak Land Consolidation and Rehabilitation Authority (SALCRA) managed schemes were introduced in 1993. SALCRA is a joint venture between the government and private companies and aims at introducing large-scale oil-palm estates and the necessary infrastructure (secondary roads and drainage) to facilitate the growth and harvesting of oil palms.

The majority (over 85%) of the biliks within six longhouses in Plasu have a share in the SALCRA-run scheme to cultivate oil-palms. Resulting from this, the amount of land left to cultivate and engage in traditional cultivation has decreased. More-over, due to the predominance of peat soils and swampy conditions in the studied area, the amount of suitable crops which can be grown is limited. Less forest are now available to extract non-timber forest products (NTFPs), as commercial schemes take over land areas where subsistence shifting farming was originally practiced.

Consequently, farmers are faced with the alternative of cultivating swampy areas and collecting wild foods or for-go their subsistence practices in favour of Oil Palm plantations. Such choices and its consequences ultimately affect each household.

With these changes though, social systems and interactions within biliks in a longhouse and within the longhouses in the area would also change to adapt to the dynamics. Thus with a concentration on the farming strategies of Plasu farmers, the subsequent dietary habits of the community and how their social interactions are affected, the following work seeks to identify the changes in livelihood assets of farmers and the wider community, and the vulnerabilities and benefits, that come with commercialization in Plasu.

The five capital assets of livelihoods: natural, social, human, financial and physical as described by DFID (2000) was used as a framework to study how commercialization is changing the siocio-economic livelihood in Plasu. While all livelihood strategies are vulnerable to different trends, shocks and seasons (DFID, 2000), it is hypothesized that the commercialization of Plasu community will make it more vulnerable to both inside and outside forces. Furthermore, the interactions within the community, such as food patterns are also likely to change and influence the cultural values.

Consequently, the following were formulated to guide the investigative research:

Main Hypothesis

A change from subsistence farming to commercial farming causes new effects on the livelihood strategies of the Plasu community.

Main objective

To analyze the consequences of the adoption of new livelihood strategies within the Plasu community.

Specific objectives

To determine the livelihood strategies of the Plasu community

To identify the types of subsistence and commercial agriculture in Plasu

To evaluate how the local management of natural resources and land use have changed in Plasu?

To analyse social activities and thoughts that are related to community connectedness

To analyse the change in food pattern as land use have changed since the construction of the Kabong-Selalong road

Methodology

Prior to arrival in Malaysia, time and care was taken to prepare a synopsis (Appendix XXX) to clarify a feasible aim, objectives and research questions to guide the practical work. The methods chosen were thought to be the most suited to collect high-quality data, with attention to issues of validity, reliability and triangulation, within the ten day research period.

Upon arrival in Sarawak, two Malaysian counterparts completed research team and the group divided up into 3 sub-teams. This was done to allow greater coverage and more in-depth data collection on the three main research areas. Information and data needed in order to answer the research questions were gathered by using the following methods:

Key-informant interviews

Clarifying interviews was conducted with key informants to obtain overall information concerning the studied area, its structure and the reality faced by the villagers. The headman of the Rh. Beji Longhouse, two elderly men and two mid-aged women were used as key informants.

Questionnaires

A questionnaire survey within the biliks of the Rh. Beji Longhouse was done in order to supplement preliminary information about the longhouses. This served as the pilot survey as the other five longhouses were then later surveyed.

No preliminary pilot-test of the questionnaire was done, thus possessed irrelevant and ambiguous questions which did not directly address the aims and objectives of this work. After the first interviews, a number of irrelevant questions were omitted.

Structured interviews

Two structured interviews were done with two women in their 70's in order to get an idea of how the food pattern has changed over time. This gave an early overview of what has changed and allowed for further enquiry and probing at later stages in the field work.

Semi-structured interviews

Semi-structured interviews were used to facilitate two-way communication between the researchers and individuals from the six longhouses about the circumstances in the village as well as general information about the households (qualitative understanding of the choices of farming strategies, dietary habits, norms and taboos as well as to comprehend social perceptions of the village's dynamic situation). This method allowed sensitive issues to be dealt with accordingly and by using individual and group interviews the strengths of both were optimized.

Remarks: In order to guide the conversation the interviewers need skills and experience, for example to probe at the appropriate time. The interview gave large quantitative of information and team meetings were held on a regular basis to help identify similarities and sift through the non-relevant information.

Non-structured interviews

Non-structured interviews were important in determining key issues in the community, giving context to the research as well as building friendship and trust between the researchers and the community members. At the same time opinions and biases were expressed. Bearing in mind that the informants was

not always available at most appropriate times, informal conversations allowed the capturing of relevant information that otherwise had not been opinionated through the planned activities. Furthermore, it was used to triangulate data gathered by other methods.

Participatory Rural Appraisal (PRA)

PRA methods were used to access important local knowledge and facilitate relevant comparisons between different strata (men, women; old, young).

Remarks: The researchers became aware that the physical setting where the PRA activities were held influenced the way the villagers participated. Activities organized in the headman's house influenced the way people answered and this had to be taken into account.

Community Mapping

Three groups of men, women and children respectively, were asked to map Plasu based on their perspective. Existing natural resources, boundaries and physical elements such as important buildings and holy places were asked to be pointed out. Comparisons were then made to identify different perspectives amongst the groups.

Remarks: Little privacy, interferences from outside individuals and first-time interaction between the researchers and individuals in the longhouse influenced the first PRA exercise. This was taking into account when setting up the following activities.

Transect walk

Two transect walks were planned based on information from the community maps. In an effort to cover a larger area, the researchers divided into two groups,. Resource persons from the Rh. Beji longhouse helped as guides and elaborated on visible problems and potentials upon request.

Remarks: Difficulties with accessibility caused changes in the planned transects through jungle and fields. After directions from the informant, the two sides of the main road were covered instead. This was more time-efficient as the walk took up less time but it caused large similarities in the information the two groups gathered and some aspects were only observed from a distance.

Social-relation mapping

The Rh. Beji headman, accompanied by volunteers, attempted to give the names, gender and ages of all the members in his longhouse. This was done to obtain a broad overview of the kin-relations between biliks and facilitated finding possible informants.

Seasonal calendar for farming strategies

With the objective of obtaining an as-detailed-as-possible view over agricultural activities performed during the different month of the year, a group of 8 farmers, chosen by the headman, were asked to draw a seasonal calendar. The heavy work period and free time where the subsistence farmers are available for alternative employment was identified.

Remarks: A summary of the general farming methods were obtained. There was no common consensus amongst the participants as each participant indicated that they would do different activities during the same time period. Throughout the activity though, two farmers dominated the discussion within group, reducing the representativeness of the data.

Seasonal calendar for dietary habits

Two seasonal calendars were attempted to obtain a more representative overview of the variations in the diets. The first was done with a group of middle-aged women responsible for cooking in their biliks and the second with a male respondent who spoke fluent English and was relatively well educated. This exercise served to triangulate the information gathered on the harvesting periods from the farming strategy group and elaborate on results from the food diary exercise (See Supplementary methods).

Remarks: The first attempt to make a seasonal calendar with the women failed because of difficulties with expressing and translating the tasks. The second try proved successful mainly due to the fact that the informant spoke English.

Trend analysis

In an effort to analyze important changes in farming practices and to get information related to community group feeling about these tendencies, two trend analysis were done each with one elder farmer of opposite sex. The results were compared and analyzed.

Preference ranking

With the view of ranking the preference by the farmers in Plasu of the different available cultivatable crops, this exercise was carried out with a total of seven male farmers chosen at random.

Remarks: Due to time restrictions, farmers were chosen on availability at the time of the exercise therefore it is note that they may not be the most representative farmers of Plasu.

Income and expenditure matrix

To investigate the principal income-generating activities in the community and to show the most regular expenditure, a matrix was done with five available informants.

Remarks: The group consisted mainly of men and as involvement from the one female was minimal the data only represent the males perspective on the subject.

Network mapping

The complex system of exchange between biliks within the Rh. Ayum longhouse and within longhouses in Plasu was mapped. This was done to illustrate the need of each community member and to gain a greater understanding of the social and economic ties.

Remarks: It would have been useful to compare and analyze the networks present in more than one longhouse to triangulate the data and achieve a greater representativeness. Yet, the information gained was useful as an example of the network inside and within the longhouses in Plasu.

Water Analysis

Tree Water samples was collected from each a fishing spot, the main drainage from a paddy-field, the main river and an area previously used to bathe upstream the river from the longhouse. The samples were analyzed to triangulate the villager's perception that the rivers, distributaries and drains are polluted.

Soil Test

Soil was sampled from a 15-year old oil palm plantation, a newly established oil palm plantation (6 months since the secondary forest here had been cleared) and a secondary forest to characterize and compare the bio-physical and chemical status

Observations

Direct and participant observations were done continuously from the moment of arrival to that of departure. Aspects ranging from the landscape to social norms and body language were noted in an effort to discover hidden confounders and to triangulate data obtained through other methods.

Supplementary Methods

Food diary

The food diaries were used to obtain the villager's report of what they had eaten. Two women from Rh. Beji and three women from Rh. Jain volunteered to write down what their bilik members, in total thirty-two people ate (including snacks & drinks), during a two (2) day period. The answers were followed up by a discussion and analysis of the data together with the women in question. The results were used as a base of a group discussion which included the participating bilik and non-participating bilik members to discuss the origin of food products, their choice criteria and potential problems in current food habits.

Remarks: Within the household only one individual wrote down what was eaten for the entire family (up to nine people). This influence the thoroughness of the data, it was for example observed that the snack the children eaten in between meals were not always recorded. Furthermore, the food diaries did not give the food source or the ingredients used to prepare the meals.

The data collected via this method only represented what the respondents ate on a specific day during which the research was conducted. With this in mind, a seasonal calendar of the food habits was attempted in order to obtain a more representative idea of the diets during the course of a month and to the greater extent, a year.

Listing of Food Sources and Problems

Longhouse members from Rh. Jain were asked to list the main food products consumed from the three source categories; jungle, crops/livestock and market. This was done for the present and for the period before the construction of the road. The activity was extended with a group discussion of problems associated with the community's reliance on the market as their main source of food and their preferences for the future.

Food Source Mapping

Based on the womens community map a group of mothers listed the foods they regularly collect in the jungle and plotted in on the map.

Youth food knowledge and preferences

From a list of foods collected in jungle by adult beji women, a group of young people were asked to draw and locate the plants on the community map. This indicated if they were able to recognise the plant and knew where to find it. Furthermore they were asked if they like eating the food or not.

Food crops, livestock and s food from the market were also touched upon in the discussion.

Longhouse shop inventory

The small outlets attached to Ayum, Beji and Juntan longhouses were visited, in order to take an inventory of these shops and what is available, in terms of food commodities to the community. This impromptu

data collection method was inspired because it was repeatedly observed that children in Beji would come from the shop with sweets, snacks and ice-pops.

Remarks: At the time of the research the children were on holiday and taking the fluctuation over time into consideration the shopkeeper in Juntan was interviewed and the information triangulated in Beji.

Lunch served in the ricefield huts

Most people in the Beji longhouse work in the rice fields during the harvest season. In order to cover this fact, a list of what was served one day in three rice huts/families was made and at the same time interviews were conducted about food habits while working outside the longhouse.

Remarks: interviewing and listing direct observations in the rice hut gave more accurate and 'in situ' data and utilize the time when not many informants are available in the longhouses. However the results are limited because they cover only one day and three situations.

General remarks

Inability to generalize beyond Plasu

The frequent use of non-probability sampling to select some of the respondents and the open-ended nature of the responses made it difficult for the researchers to access the extent of the studied phenomenon, though an accurate understanding of the prevalence was sorted after.

The use of translator

An Iban-English translator was assigned to the research done in Plasu, whilst another was present on part time. At times, also the Malaysian counterparts were acting as translators. It was experienced that primary and maybe relevant data was lost doing translations and summarizing of conversations. During some interviews, it was deemed more important not to interrupt the "flow" of the conversation to have the data translated. It made it even more important to give brief but precise instructions, to include the interpreter in the group discussions and briefings.

Interviewer/evaluator effect

The researchers were mindful that in some cases respondents were shy or intimated by our presence and therefore did not gave more than short yes/no answers which made it difficult to evolve a deeper conversation. Often this manifested itself through non-verbal responses which at times supplemented and at others, contradicted the verbal responses. Also, predispositions and pre-judged biases of the researchers' could have easily distorted the results obtained.

Results and discussion

Welcome to Plasu

Welcome to Plasu, located along the new Kabong-Selalang road in the state of Sarawak, Malaysia. The Iban community of Plasu consists of six relatively small longhouses with a total population of approximately four hundred and eighty residents. Rumah Beji is the largest of the longhouses and was the starting point of our research.

As illustrated in the timeline, The Plasu community has gone through a number of important social and infrastructural transformations (Figure XX). Government aid in the form of agricultural schemes has dominated the history of this community. This shows the close correlation between the community's infrastructural and agricultural development and their dependency on government aid.

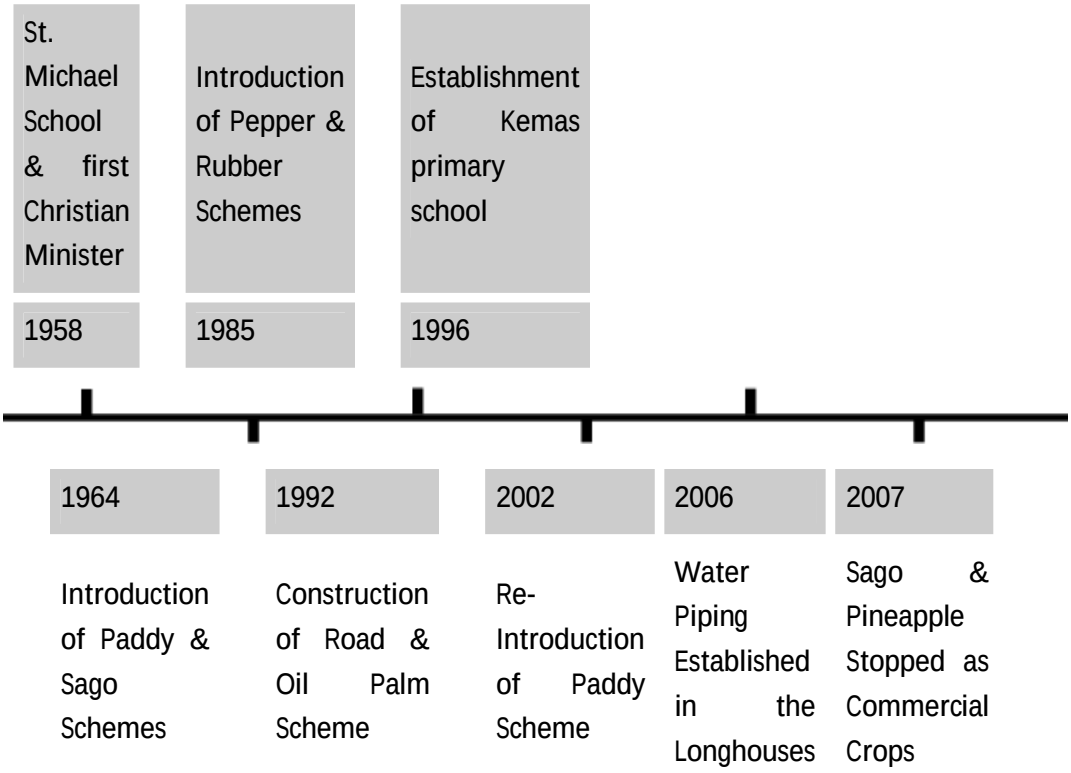
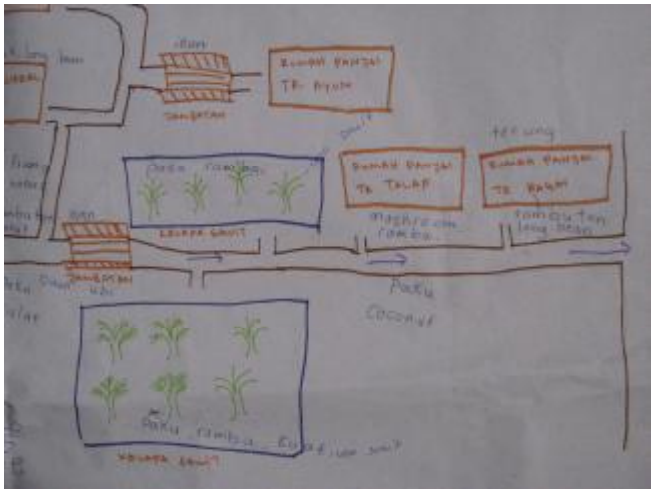
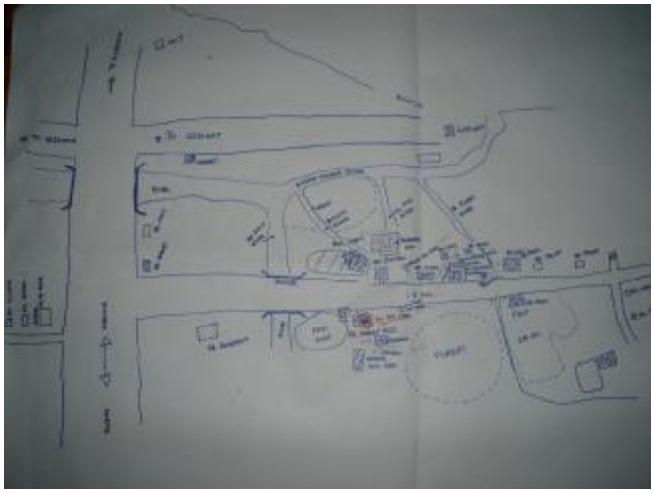


Figure 1, Timeline showing key events as perceived by members of the community in Plasu

When asked to map their community to get an overview of the study area, differences were observed in comparing the maps drawn by the children, women and men. Box 1 presents a comparison of these maps.



Women's map

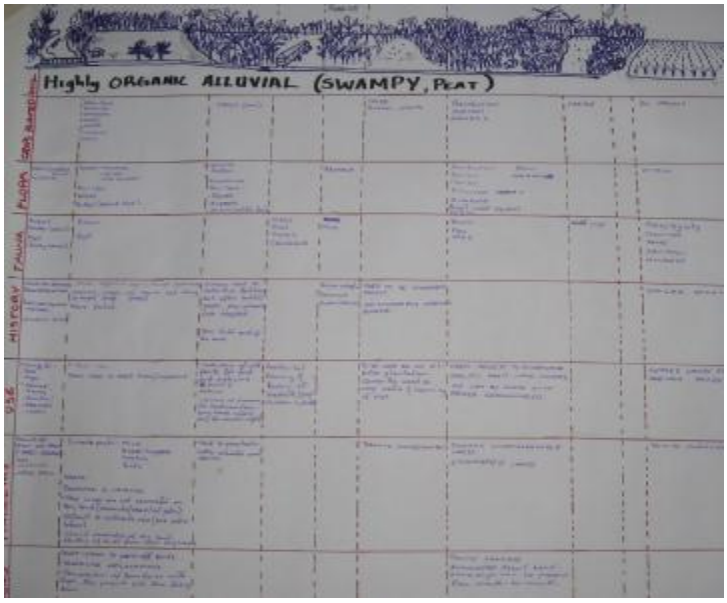


Men's map

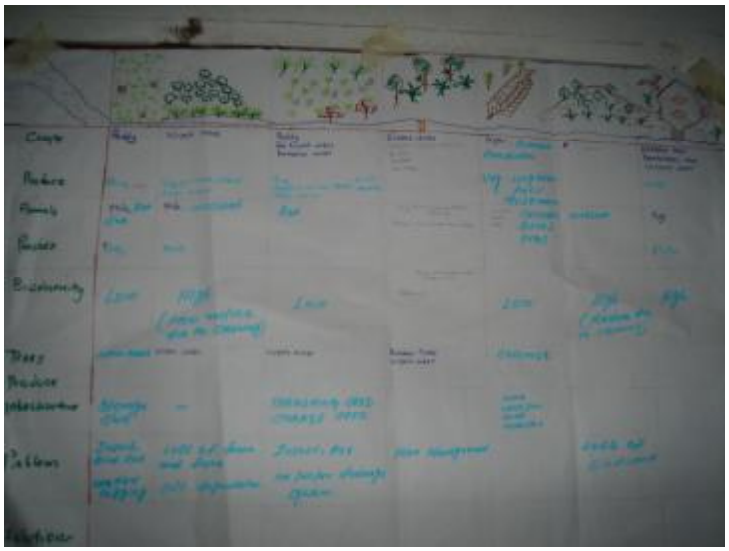
The men had a more detailed map of the cropping systems including the number of trees and hectares of sago, rubber and oil palm as well as a detailed map of the Batang Nyabor River and its feeding creeks. This is in comparison with the women who did not seam to focus on anything special but did include the paddy fields. Interestingly, the men did not include the stream located behind Beji longhouse which was believed to be polluted and from which we took water samples. The men included directions to the nearby towns Gerigat, Kabong, Sessang and Roban while the women indicated only Sarikei, the nearest & most popular market. The women and especially the children made their own longhouse much bigger then the other longhouses and placed it in the centre of the drawing, the further longhouses were smaller in accordance with their distance

Box 1. Community map of Plasu

The transect walk provided an insight into the changes in land-use patterns. Paddy rice fields and the remnants of abandoned plantations of sago and coconuts dominated the landscape. Box 2 shows the results from one of the transect-walks conducted with the entire group. Factors such as land-tenure rights, inaccessibility through forested lands and excessive water-logging of the peat soils and lack of drainage were the main problems cited that impeded subsistence agriculture.



Right side of Kabong-Selalang Rd



Left side of Kabong-Selalang Road

The Kabong-Selalang road was built in 1993 and is now the key vein between the six longhouses in Plasu as well as to the outside world. It provides important access to the paddy fields for transporting the harvest as well as access to the markets (Roban, Sarikei and Saratok). The transect walk identified the flora, fauna, crops, history and problems of both the left and right side of the road. Both key informants (in each group) said lack of drainage is a problem of the land covered by paddy and that for this reason coconut, sago and oil palm could not be grown on this particular soil.

In addition, it was observed that paddy field boundaries were demarcated using banana trees and fenced off rope. This division of the field remains unclear and according to the key informant these boundaries change on a monthly basis.

Box 2. Results from the first transect walk conducted

Graph comparing the Education Level of the different Genders surveyed

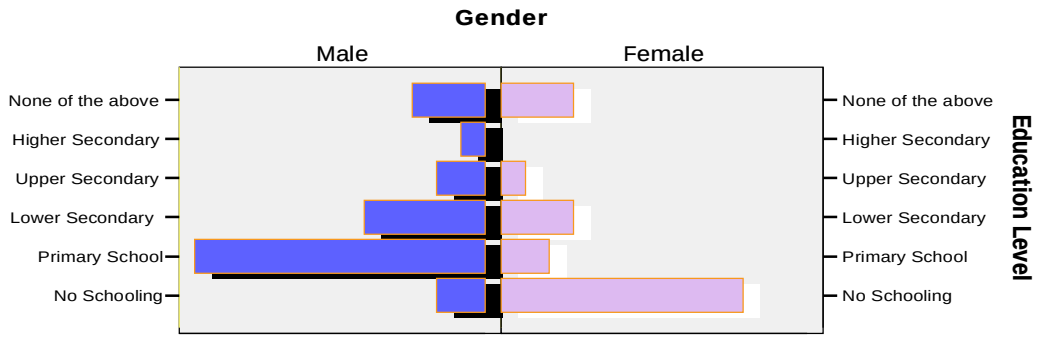


Figure 2, Education level of the different genders

The main difference in the level of education based on gender is clearly distinguished from figure XX. Men have maximum percentage at all levels of schooling compare to women who have never attended school.

Histogram showing the Average monthly earnings of inhabitants between the longhouses in Plasu.

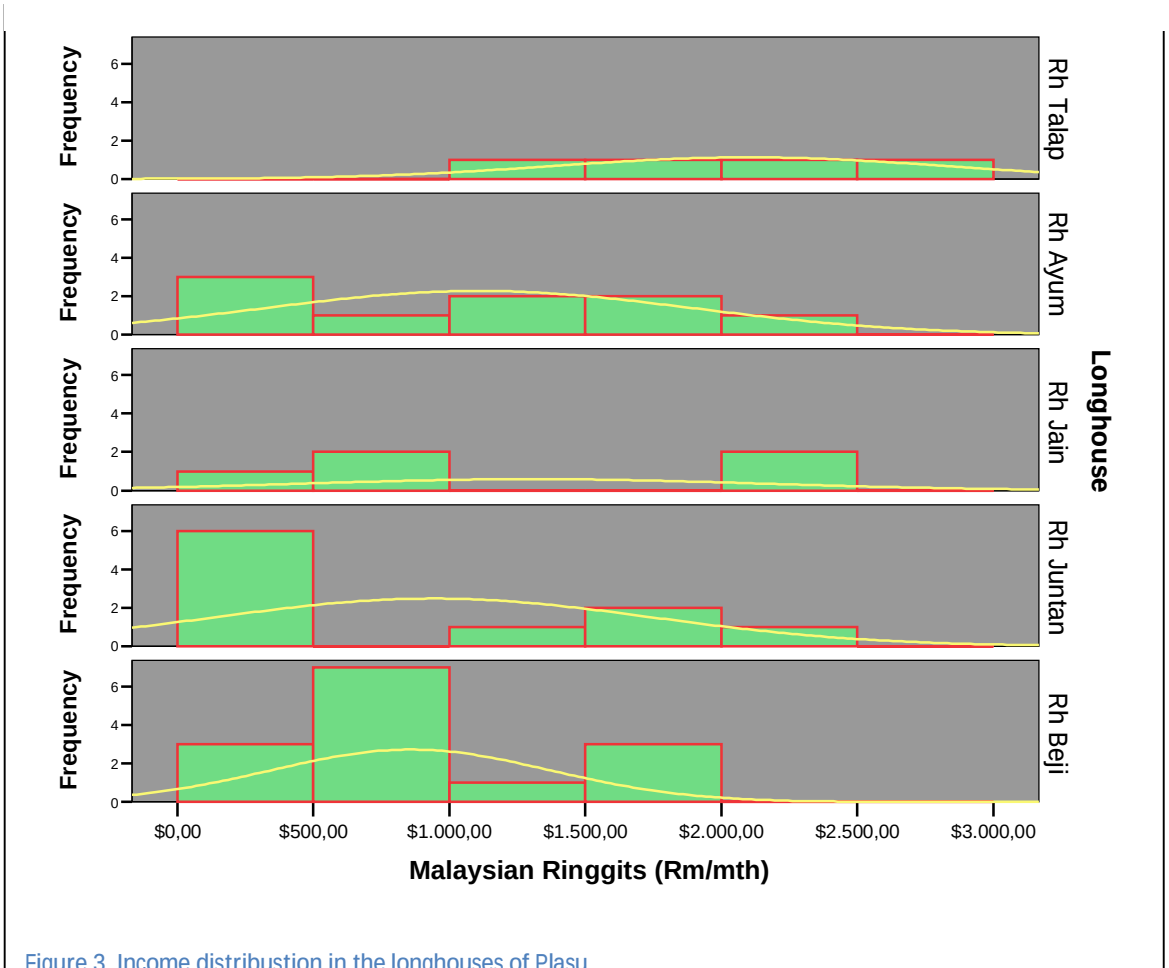


Figure 3, Income distribustion in the longhouses of Plasu

Among the six longhouses Rh. Juntan has the maximum number of individuals receiving a low monthly income within the range of 0,00 to $1.000,00 RM. This could be due to the fact of receiving fewer subsidies and less contribution of land to the oil palm scheme. While Rh Talap, which has the maximum number of individuals in the range of $2.500,00 to $3.000,00 is continuing to develop more land into oil palm in addition to practicing other farming strategies such as raising livestock for sale.

Farming Strategies

A visit to any of the longhouses in Plasu was greeted by the presence of fruit trees and domesticated animals which could be used as a source of food. The presence of such home-gardens confirmed that agriculture was still a mainstay for many of the inhabitants of this Iban community. Photo 1 illustrates such a finding, where the community used materials that were readily available from nature to support their livelihood. This in accordance with Freeman, who in 1992 stated agricultural practices of the Iban people are strongly influenced by the cultural and social environment in which they live.

Photo 1

Agriculture related evidence from the backyard of a bilik.

The presence of coconuts and fish traps typical evidence of the agricultural mainstay of the community. Made from bamboo, these fish traps were scattered near the longhouses and some were observed in the streams near and far to the longhouses.

An inventory of the home gardens showed vast similarities the crops and livestock exploited for subsistence by the Plasuians. The following is the inventory of crops and livestock identified and observed:

Crops

Corn
Cassava
Pepper
Pineapple
Yams
Coconut
Guava
String beans
Turmeric and other spices
Rambutan
Banana
Longbean
Papaya
Chilli
Durian
Cucurbits

Livestock

Ducks and geese
Pigs
Chickens
Turtles
Doves

Understandably, differences occurred in the amount of each particular livestock and the amount of land allocated per crop, but on average, 0,5 Ha were allotted to home gardens per longhouse, the largest being roughly 2 Ha. and animals were collected, activities which have a historical importance.

Changes in Farming

It was concluded from the trend analysis, that until forty-five years ago, subsistence agriculture and collection of Non-timber Forest Products (NTFPs) dominated the livelihood strategy in Plasu. From the onset of the 1960's, government introduced subsidies and promoted different crop schemes to improve the quality of life of the hill tribes (of which Plasu was part of). Table 1 gives an overview of the crop-schemes introduced over the years and the type of subsidies and incentives offered.

Table 2, Subsidies and Incentives given to different cropping-schemes in Plasu from 1960

Crop	Subsidies/Incentives
Sago:	Pesticides, fertilizers and harvesting tools
Paddy:	Pesticides, fertilizers and harvesting tools (machetes, shovels and wheel barrows)
Coconut	NA
Rubber:	Pesticides, fertilizers and training
Pepper:	Pesticides and fertilizers
Oil Palm:	Dividends twice a year depending size of plot contracted to SALCRA. Drains and Secondary roads

Subsidies took the form of fertilizers, pesticides and harvesting tools in an effort to make cultivation more efficient and subsequently obtain higher yields. With the increasing yields, farmers were able to sell the surplus production, thus slowly introducing a commercial aspect to farming. Cultivation of these commercial crops intensified with time, so did the land allocation and yield/area as shown in Table 3.

Table 4, Agronomic aspects related to the provision of subsidies

Particular	Crop	Average Acre/ Bilik	Yield/Area	Payment per Kg (Rm)
Home Garden - fruits	0.5	NA	Self-consumption	
Before the provision of subsidies	Paddy	2	500-600kg/acre	1.10
	Rubber	2	830 kg / 100 trees	1.30
	Pepper	2	15 - 21 kg /100 trees	1.50
	Sago	2	3kg/ tree	0.50
	Home Garden - fruits	0.5	NA	Self-consumption
After the provision of subsidies	Oil Palm	`5 - 10	2500 kg/acre	20
	Paddy	´3 -5	800 - 1000 kg/acre	16 - 17
	Rubber	`4 - 5	1000 kg / 100 trees	6
	Pepper	0.5	20 – 25 kg / 100 trees	`8 -9
	Sago	2	20 kg/tree	4

Crops such as rubber, pepper and sago produced higher yields after the introduction of schemes is mainly due to the commencement of modern crop-husbandry techniques such as fertilizing, and spraying for weeds, pest and diseases. Interestingly, oil-palm was introduced after 1992 (the year the main Kabong-Sesang road was built). This brought with it modern infrastructure in the form an irrigation-drainage system for the area. Distributary roads were built and forested lands were cleared for the first time with the aid of tractors and other heavy machinery.

Shifting the farming strategies

Though Schemes was mainly responsible for the introduction of these new farming techniques, this affected the way local farmers conducted their daily farming activities. Table 5 seeks to summarize an example in the changes of the farming strategies of the farmers.

Table 6, Change in Farming Strategies

Crop	Techniques	
	Traditional	After 1992
Paddy	The Iban-way: Nursery : Wet soil is placed on dry soil. The seed is sown on the dry soil for at least 2 weeks before planting. Transplant : A singles stick with sharp pointed edge is used to make a hole and to trans-plant the seedling from the nursery after 15 days. Spacing normally 1 feet each. The paddy is harvested using a small knife and takes nearly one month to harvest an acre and the yield is 500-1000 kg/ acre	Nursery: sow the seed in the corner of the field and transplant to the main field after 1 month Transplant : Use single stick which divided into three pointed edges with the spacing of 1 feet apart to make a hole and to plant the seedling. Spacing normally 1 feet each. After 1 month they use fertilizer (17– 15 – 10 NPK) The paddy is harvested using a small knife and takes nearly one month to harvest an acre and the yield is 1000-1500 kg/ acre The Chinese Way Farming Practices: Harvesting using long spade. Possible to harvest 1 acre within 14 days Less time consuming More fertilizer use more yield: 1500 kg / acre Note: The local people prefer to practice Iban way because they are not well trained in the other techniques and against their traditional belief to change.

Rubber	Plant density : 6 x 20	Plant density : 6 x 8 (increase the no. of plants per unit area).
	Terrace cultivation was practiced with no fertilizer application.	Cultivation practiced on plains Fertilizer – Zargo (granula blend) cost RM 40/ 50 kg is applied
	Time of working 2.00 am departure to the field and start the tapping at 6.00 am and collecting the latex at 1.00 pm. Boat was used to go the market once a month – 4 hours travel Yield : 15 kg / 300 trees per day Prices : 1 kg / RM 1.30	Time of working hour: 6 am to 10 am Use road to go the market daily Yield : 25 - 30 kg / 300 trees per day Prices : 1 kg / RM 8.00
Pepper	Plant density : 6 x 6	Plant density : 6 x 6
	Fertilizer ; 10 to 15 kg of rotten-fermented fish as manure, making the hole and burning the wood and warming the soil.	Provided subsidies once a year ; fertilizer and pesticides Time of working hour: whole day Use road to go the market daily
	Time of working hour: whole day Use boat to go the market once a month – 4 hours travel	Yield : 85 kg / 600 trees per year Prices : 1 kg / RM7.00 – RM8.00
	Yield : 65 kg / 600 trees per year Prices : 1 kg / RM1.80	
Sago	No fertilizer used. Own consumption.	Received subsidies from the government in term of fertilizer, axes, stone and RM 300 per year. Yield : 20 kg / tree Prices : 1 kg / RM 4.00 Grown mainly as pig-feed. Sago-worms are also harvested from the stems of this plant with moderate human consumption of the sago-root.

Interestingly, although the farmers are aware of some modern practices of crop-production, they are not practiced mainly because these practices are not in line with traditional norms and beliefs and enough training is not provided from the relevant authorities. Agricultural extension services were reported many informants, to be lacking in the area.

Without a doubt, oil palm cultivation occupies the highest percentage of land allocated to agriculture in Plasu, and to a greater extent, the entire Sarawak region. Not surprisingly, more than 50 percent of Plasu farmers presently clearing the land for oil palm cultivation, whilst over 90% of the biliks from the six longhouses have lands leased to SALCRA. From the Rh. Beji longhouse alone, 87,3 Ha of land is currently leased to SALCRA for development schemes with oil palm.

The success of oil-palm schemes

The various schemes developed for various crops mentioned earlier were not successful because they were not able to perform favorably under the swampy conditions of the soil in the area. Furthermore, many respondents cited that the rubber scheme for example, due to the inability to predict the unstable market prices and failure to guarantee employment, was not favored. Such findings were in line those of Ndigang (2002). The case of pepper is presented in Box 2. Further reasons such as too little Government help via the schemes made it unprofitable to embark on such production.

Photo 2
Pepper: A non-economical alternative
Now pepper is not being cultivated commercially in Plasu because yield can only be harvested once a year. The husbandry activities are time consuming and endless. Price fluctuations and high initial costs do not help. A high-fertilizer demand and lack of Governmental subsidies has sealed the fate of this crop only to home-gardens.

Contrastingly, oil palm schemes presents new perspectives to the community. All of the initial cost of production are borne by SALCRA. The contrasting side is the villagers are not private owners and have no decision-making powers. Never-the-less, 98% of the individuals saw oil palm as good to the development of the community, though they blamed the agro-chemicals for polluting water-ways and wild plants.
Similarly, the contract labour provided was seen by some as yet another positive aspect to this scheme, whilst others stated that the pay was not enough. Others were not satisfied with the fact that the labour

was on a contractual basis for activities such as weeding and fertilizer application only for three months during the year. Box XX explains the basis on which SALCRA distributes dividends.

Photo 3
Distribution of Dividends by SALCRA

The development costs in the SALCRA-run schemes are treated as a loan to be repaid through installments by deduction from the sale of fresh fruit bunches to the processing industry. Annual dividends are distributed from profits derived from the sales of fruit

The land-leasers accredit the earning of dividends of nearly $3200 RM per year per acre as one of the major reasons to join the SALCRA schemes. The other being the assurance of land title after 25 years which otherwise would be very costly and time consuming if done on an individual basis.

This is also in line with findings from seasonal farming calendar, shown in Figure 4, which indicated the crucial money shortage period of farmers between May to November during which they relay on dividends and contract-work in oil palm fields. This exemplifies their dependence upon financial resource for farming activities and to afford different goods and services, but also more globally to maintain the current livelihood strategy. This observation is in accordance with Rigg (2006) who stated the Ibans are attracted by commercial production instead of subsistence agriculture.

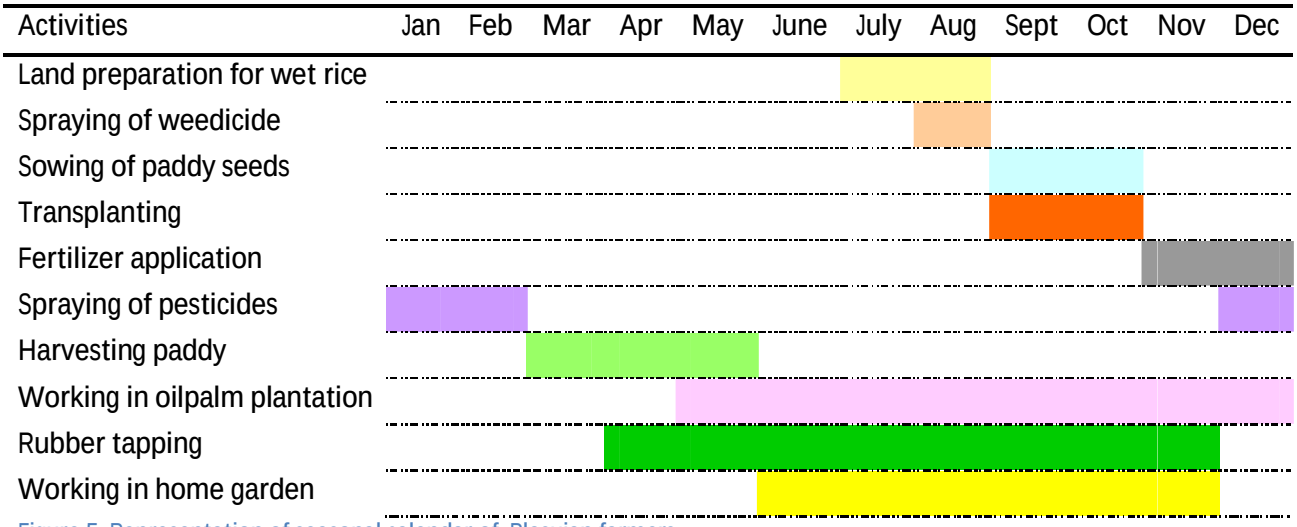


Figure 5, Representation of seasonal calendar of Plasuian farmers

Interestingly, no respondent analyzed what would happen if prices of oil palm were to decline over a sustained period of time, making it unprofitable to SALCRA to engage in production. One individual though cited his interest in perusing his private production of oil palm stating:

"…the Government smart, they do not tell you how much profit they make, but they just give you something, that why I will do my own thing…"

This individual openly admitted that he was better-off financially than other members of his longhouse, thus he was able to bear the initial cost of initiating production. He saw it as a sound-financial investment and was willing to wait up to five years to begin recovering his initial costs. This case is by far non-representative of all Plasu. Yet it illustrates that no matter the financial situation, individuals willingly embrace oil palm production, without giving much thought to future vulnerabilities, nor the possible negative anthropogenic changes such an endeavor may cause.

Biodiversity changes

Two vegetative samplings within meters of each other, indicated that in the 15-year old oil palm plantation, plant diversity was reduced to two species compared to the secondary forest which had fourteen woody-species as found in Table 7

Table 8, Sampled vegetation in a 15-year old oil palm

Species (Vernacular name)	
Oil Palm Plantation	Secondary Forest
Paku Uban (Fern)	Midong (Alangium harilandii)
Midin (vine-like shrub)	Medang (Litsea spp.)
	Menua (Macaranga spp.)
	Engkabang Utan (*Shorea spp.*)
	Medang Bau (Litsea Resinosa)
	Garik Kain (*Shorea spp.*)
	Bunsi Paya (Microcos borneensis)
	Upi
	Teburok (Stemonurus secundiflorus)
	Keruin (Dipterocarpus spp.)
	Empili (Lithosarpus spp.)
	Entungan (Bluneodendron spp.)
	Kayu Malam (Diospyros spp.)
	Uban (Eugenia spp.)

Finlayson *et al.*(2002) stated that some of floral species found in the vegetation-sampling (example: Keruin and Uban) are endemic to this unique peat-swamp habitat. They futher reported that 75% of the tree species found in peat swamp forest in Peninsular Malaysia are not found in other habitat types world-wide and some have relatively restricted distribution. If this sample was representative, one would thus see the urgent need to conserve the woody flora against being totally cleared to set up oil palm plantations.

Already, key informants are able to list plant and animal species which are no longer found in the vicinity of oil palm plantations. Table 9 categorizes and list these resources.

Table 10, Flora and Fauna present before and after the establishment of oil palm plantations in Plasu

Type of Natural Asset	Species still present	Species lost
Fish	Ikan Keli	Gedebuk
	Haruman	Sembilang
	Tuman	Guneng salted fish
	Emplasik	Bubak
	Udang	
	Baong	
	Lukan	
	Tekuyung	
NTFP	Upak Upak	Menua
	Daun Saboung	Perawan
	Palm and Rattan shoot	Keruin
	Umut Maram	Mengeris
	Umut nibong	Meranti
	Kulat mata babi	Temuda
Wildlife	Pelanduk	Squirel
	Empilau jel	Wild cat
	Monkey	Musang
	Gibbon	Manyas
	Wild boar	Kera
	Ant eater	Primates Kera Beruk
	Pythons	Bats kesindap
	Musang	
	Rat	
	Flying fox	
	Porcupine	

With less than twenty years of oil palm exploitation, the effects on the biodiversity can evidently be seen. Plant biodiversity significantly decreased, as the palms, during their last stage of growth, close the canopy. This implies that only shade tolerant species and low sun-demanding C_3 plants, could possibly thrive under such conditions. Thus the original low-layer vegetation would we altered. The herbivore population who consume such fauna would consequently decrease as their primary source of food diminishes. Hence, the entire food chain is affected with the secondary consumers possibly migrate and/or becoming extinct.

Currently, the land use pattern where oil-palm is cultivated is strictly mono-crop. Information about the possibility to introduce a mixed-crop system by SALCRA could not be obtained because of the inability to interview SALCRA officials. It would be interesting to investigate whether any authority has, is currently or plans to investigate the possibility to incorporate other crops into oil palm plantations in Malaysia, to maximise land-use efficiency. Special focus would then have to be placed management in peat soils due to the constraints they present.

Peat soils and the constraints they present to Plasu

The major constraints peat soils present is a low soil bearing capacity (7.7 KNm^{-2} at the surface) and poor trafficability due to presence of woody un-decomposed and partially decomposed materials. This thus hampers mechanized farming. Low fertility, high acidic condition and root anchorage problems lead to the reduction of diversified farming system in Sarawak. By introducing drainage, the texture and structure of peat soils are changed as this causes surface subsidence due to shrinkage, compaction, decomposition, leaching, irreversible drying and loss of peat material during reclamation.(Finlayson *et al* (2002)

These statements are in accordance with observations and analysis of soil test done. The pH recorded for the oil-palm field averaged 5,4 for the first three layers cumulatively. Meanwhile, in the secondary forest, pH levels averaged 3,5 for the same layers, showing that the soil was less acidic in the oil palm fields. This can be attributed possibly to the long presence of drains in the oil palm fields. The color, structure and levels of organic material in the first two layers also showed vast variations between the two fields (see photo 4). The drained oil palm fields had less organic material than the forest layer.

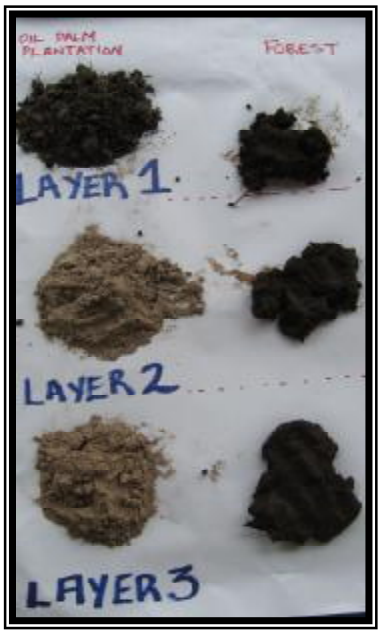


Photo.4
Textural and colour difference between sampled soils.
The drained oil palm soils were finely-textured reaching its highest silt levels in Layer 3. Contrastingly, the forested areas showed typical peat-characteristics. This confirmed that the setting up of oil palm plantations changed the physical properties of the soil.

Environmental Perspective of the new farming strategies

Oil palm plantations have resulted in a number of environmental impacts, among which deforestation, biodiversity loss and pollution due to extensive use of agrochemicals (Sujang, *et al.* 2005). All those impacts result in loss of livelihoods for local people and the deterioration of the environment in which they live.

Among the major impacts, the following have been recorded:

- the difficulty of marketing palm fruit and oil associated with poor marketing facilities for the increased output.
- deforestation, and the associated growing cost and scarcity of forest products such as "bush meat", medicinal plants, and wood, an important constructional material and the basic fuel source
- the high cost, erratic supplies, and polluting effect of the agrochemicals used to boost palm yields and to control pests and weeds, especially in the large plantations
- environmental pollution by the palm fruit and palm oil effluents

Future needs

For development of plasu it is necessary to have proper drainage and water management which is expected to reduce the subsidence rate, and consequently lengthen the life of the peat deposit. Drainage is also required to improve the bearing capacity of the ground to facilitate agricultural processes, including tillage. Heavier machinery will require with .higher bearing capacity, and thus deeper drains.

Food Pattern

Food Pattern is an important part of people's livelihood as it above nourishment is a part of the culture and peoples feeling of identity and well being. Indigenous people are increasingly affected by non-communicable diseases such as diabetes, obesity and cardiovascular diseases, often the result of change in diet and lifestyle (WHO 1999). The Iban people in Plasu have, as concluded in the earlier chapter, gone through a change from subsistence to more commercial farming strategies. This chapter will focus on the food related changes in lifestyle.

We will present the main findings regarding the change in food sources, diet and food knowledge in Plasu and discuss the consequences.

Food sources

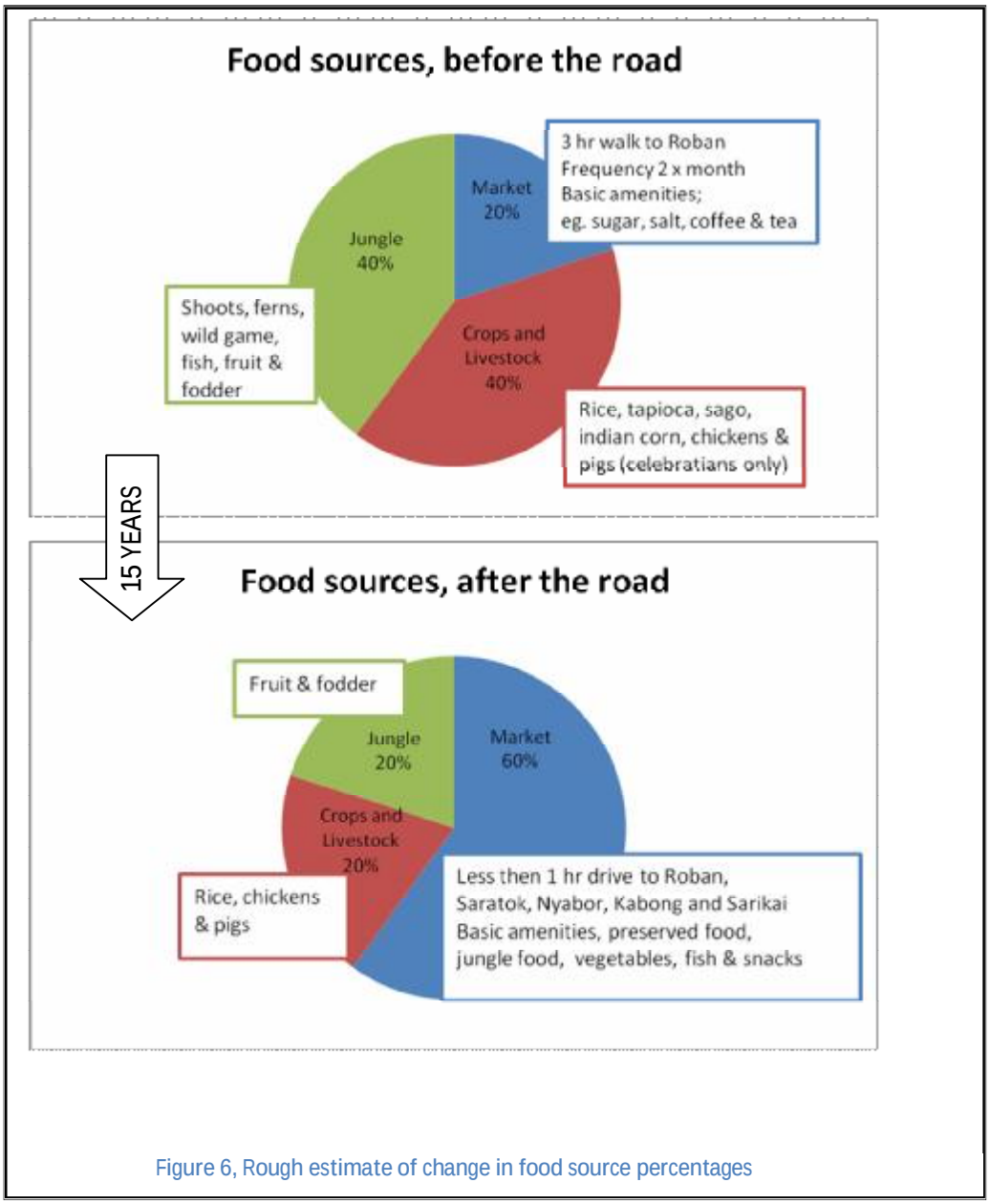


Figure 6, Rough estimate of change in food source percentages

Since the construction of the Kabong-Selalong road and the introduction of the palm oil schemes in 1993 a change in the Plasu food source has occurred. The following highlights the food pattern change according to the food source and problem PRA discussion in combination with the seasonal calendar (Figure 7).

Jungle

From our observations wild foods especially ferns (kabuki, ikan and bukau) and fish (keli, toman and sembilang) are still gathered in the jungle. But corresponding to the food source mapping and discussion most of these products are now purchased at the market due to lack of time and for convenience. Three teenage girls observed in the forest explain that they collect maram (fruit) from the jungle 1-2 times per week, but that boys do this less frequently. This indicating that gathering of wild food is still a part of their lives. Due to observations and the food source mapping discussion, harvesting now takes place amongst the palm oil plantations and near to the road for easy access and because they are abundant in these areas as opposed to inside the jungle. However by observing and by questioning the women, it was discovered that most of these foods are now bought at the market. In addition, deliver trucks arrived at the longhouse on a daily basis during our stay selling a variety of items including fish and ice cream.

Market

There has been a large increase in the quantity of food products bought at the market (listing of food sources exercise). The construction of the road gave easy access to the previously distant markets and the introduction of the oil palm scheme gave higher income to purchase foods.

Purchasing power

In terms of purchasing power and in accordance with the questionnaire, the average monthly income spent on food is 255 RM pr. Person. From this information it could be estimated that 8.5 RM is spent on food per day per adult. From a meal of chicken, rice, paku and sawi for 2 adults, 2 teenagers and 1 senior listed in the food journal, it would cost approximately 7.3 RM per meal (using Sarikei market prices and assuming rice was not purchased). Based on this data alone it would appear that there is sufficient income to purchase adequate food.

Diet

Food Journal and interviews

The result of the food journal is listed in table 11. This table reflect all the food types recorded in the food journals and consumed by thirty-two community members over the two day period. The most frequently listed items (listed greater than six times) are the highlighted terms. Unfortunately it was not stated what the children ate in comparison with the adults or the proportions consumed to triangulate our observations.

Fish, especially the Keli fish which is found in the Batang Nyabor river was the meat most frequently eaten

Table 12, Summarised Food Journal

Morning	Snack	Afternoon	Evening
Rice	Biscuit	Rice	Rice
Noodles (fried)	Bread	Chicken (e.g. soup, fried)	Noodles
Biscuits	Orange soft drink	Fish (e.g. Keli: dried, fried, salted)	Fish
Egg	Banana	King Crab	Prawn
Bread		Prawn	King crab
Nescafe		Hot dog	Chicken
Tea		Canned beef	Canned beef
Milo		Buah maram (veg.)	Duck
Milk		Buah peria (veg.)	Pork
		Squash	Egg soup
		Long bean	Ferns
		Cucumber	Sawi (veg.)
		Bitter gourd	Cucumber
		Tapioca (tuber & leaves)	Carrots
		Ferns	Ekor (veg.)
			Belangkas (veg.)
			Sayur (veg)
			Cabbage
			Langkuk (leaf & veg.)
			Tapioca leaves
			Lady fingers (veg.)
			Long bean
			Bean curd
Highlighted terms is food that were listed repeatedly in the food journal			

The afternoon/evening meals among the biliks did not vary much during the two days and typically included rice, meat and a vegetable/green. Meat is consumed on a daily basis according to the food journal, but before the road construction meat was eaten less frequent and pig meat only during holidays and for special occasions.

Rice continues to be the staple food today but in the past when rice supplies were low, sago palm, indian corn and tapioca were served as the staple foods. These foods are primarily used for pig fodder nowadays.

Table 13, Children's snack frequency

Snacks	Frequency
Cola	Every day, breakfast
Ice pop	3 x day
Biscuits	Sometimes
Snacks	Everyday
Milo	Sometimes
Fruit soft drinks	Everyday
Ice cream	2 X week
Noodles	3 x day
Sunflower seed	Sometimes

Breakfast mainly consist of biscuits and occasionally fried noodles, both examples of processed food.
The preference discussion with the youth reveal that cola and orange soft drinks are common as well, see table 14. Two separate interviews about the past with elderly women indicate that rice porridge was the main meal in the morning and fish was frequently consumed in the afternoon/evening. Interestingly, from the interviews it does not appear that the elderly people have gone through a significant change in what they consumed as young adults and what they consume today.
The discussion that followed the youth food knowledge and preferences exercise also concerned which snacks they prefer and how often it was eaten. The children state that they eat noodles, ice pops, snack, cola and soft drinks on a daily basis.

The dietary change in consumption by the youth was elaborated by visiting the Rh. Juntan longhouse shop.

The shopkeeper in Rh. Juntan says that selling snacks and sweets is very much dependant on the children. These products, listed in table 16, are displayed in front of the shop and visible from a distance. According to Mr. Juntan, his sales are quite high on the weekends and during holidays when the children are at home. But since children from other longhouses also visit his shop, the approximate consumption of these food items per child was not assessed.

Table 15, Snack and sweets excerpt from the Food supply in Juntan Longhouse shop

Snacks and sweets
Biscuits, many kinds and packaging
Sugar crackers
Prawn snacks, 10g
Pizza snacks, 10g
Crab snacks, 10g
Chilli prawn snacks, 10g
Potato snacks, 15g
Milk snacks, 15g
Chicken snacks, 15g
Prawn snacks, 15g
Bags with 4-5 small pieces of bonbons
6 kinds of bonbons sold singly pieces

Meals outside the longhouse

We visited Plasu during the rice harvest season and it was therefore not surprising that the majority of adults were out of the longhouse during lunch hour. We observed banana palm shoots being harvested to eat in the paddy fields and wondered if there are special food habits connected to their fieldwork. This was not the case in the tree rice huts/families visited and interviewed. The menu was leftovers from earlier meals, however out of convenience there is a tendency towards consuming canned and pre-made products. For a list of foods please see appendix.
An interview of three teachers stated that during school periods lunch is now provided for both teachers and students and is 'very good'. They stated that in the 1980's the children of Plasu brought their own lunch to school but that now it is subsidized by the government. An example of lunch served at school was rice, chicken and vegetables.

Food knowledge

The Youth food knowledge and preferences exercise indicates that youth recognized and prefer foods which are cultivated either in the garden or bought at the market, as illustrated in table x. The list of plants and mushrooms was given by the women and reflect which foods they (sometimes) collect in the jungle. The youth stated that paku (ferns) and long beans among others comes from the market. This illustrates that these children more often observe the buying of ferns and previously grown vegetables as opposed to helping with their harvest. Half the plants the youth connect with the jungle, they are not able to recognise and five out of six they do not like to eat. The discussion along with the exercise gave us the impression that the youth do not find it important to learn about the jungle and that they are not encouraged from their parent. A male informant (78) said that he tries to teach his grandchildren about the jungle and most importantly how to procure salt in order to survive. He does not see it as a problem, but he also state that the children do not have much time anymore to go with him to the jungle, because of school.

Teachers interview

The tree teachers interviewed thought that obesity among children have been rising and that it is a problem (leads to laziness). But they state that health is teach along with the physical education. This information is supported by an interview with a student that reveal she have good knowledge about what food is healthy and that she have gained the knowledge trough regular lectures in school.

Replacement of jungle and loss of knowledge

After each interview done by the food pattern subgroup the participants were asked if they were concerned with the fact that a) the jungle is replaced with oil palms and b) the children have decreasing level of knowledge about jungle species and cooking. Every respondent answer was no. It was assumed that the market will replace a need for the jungle

Table 17, Children's recognition and taste

Iban name	English name	Recognise #	Like/ Dislike	Source
Mata Babi	Mushroom	5	D	Forest
Metudang	Fern	5	D	Forest
Upa Bakau	Shoot	0	D	Forest
Upa Nibon	Shoot	0	D	Forest
Upa Nyiur	Coconut shoot	5	L	Forest
Upa Rua	Shoot	0	D	Forest
Upa Apong	Nippah shoot	2	D	River
Lukan	Clam	5	L	River
Tekuyung	Snail	5	L	River
Buah Pulur	Pulur plant	3	L	Cultivated
Daun Ubi	Tapioca leaves	5	L	Cultivated
Jagung	Corn	5	L	Cultivated
Kubuk	Fern	5	L	Cultivated
Nanas	Pineapple	5	L	Cultivated
Rambai	Fern	5	L	Cultivated
Terung	Egg plant	2	L	Cultivated
Upa Pisang	Banana shoot	5	L	Cultivated
Upa Maram	Shoot	5	L	Cultivated
Upa Mulung	Sago shoot	0	D	Cultivated
Upa Sawit	Palm shoot	0	D	Cultivated
Rambutan	Rambutan	5	L	Cultivated
Mulung	Sago	5	L	Cultivated
Kelapa	Coconut	5	L	Cultivated
Ikan	Fish	5	L	Market
Kerang	Clam	5	L	Market
Retak	Long bean	5	L	Market

products and in case of troubles, the jungle can recover. This could cover over lack of knowledge and understandability of the consequences of replaying large areas of ”wild” secondary forest. But also that people are more concerned about the present situation. However, during the food change and problem PRA discussion two men that had spent time outside the village and in general were more educated raised concern.

Sub conclusion

The Beji longhouse has undergone a change in diet and lifestyle over the last twenty years

Based on the findings from the food journal, interviews and seasonal calendar more processed foods are consumed. The youth stand for most of the intake of processed food and their taste differ from that of the adults and elderly.

Wild food is still gathered in the jungle, but mostly pur at the market.

The youth have less time to learn their traditional knowledge. The youth recognize less wild plants and the plants that they recognize are mostly associated with the market and with cultivated foods. Adults do not find it important to learn about the jungle and do not encourage their children to do so.

Community-Connectedness

A social relations map of Rh. Beji was performed in order to get an overview of each member of the longhouse. The intention was to use the basic information gathered (name, age and gender) to organize our interviews and to see the family relations between biliks in the longhouse.

The map showed a tendency towards the left side of the longhouse being less interrelated then the right side. The headmans' bilik were the central hub to where most lines were connected. In the following observation those biliks "left out" were compared to those who appeared to be "in". The biliks in the left side of the building was unfinished and had no electricity. The longhouse shop and mill where owned of people related to the family of the headman family. During social events in the common corridor, most of the community members living in the left-side of the longhouse kept a curtain distance to the festive activities. Unfortunately the time was not to follow up on these results and observations.

Modernity as a goal

The Malaysian government has a 'vision' of Malaysia to become industrialized by 2020. According to the government it should develop from a state of backward undeveloped society to an attractive modern state. In Sarawak, this change is occurring mostly through the implementation of oil palm schemes. This process will bring wellbeing to society and give the country a progressive edge to compete in the global arena according to the Ministry of Land Development, Sarawak. (www.mlds.sarawak.gov.my). Anyone who hinder this movement is seen as hindering the process of becoming modern.

"A radical mental revolution is required to affect paradigm shift in the attitudes and perceptions of landowners towards developing NCL [Native Customary Land]" (www.mlds.sarawak.gov.my/project.html).

This is an attempt to change the Ibans perception of what good life and good development is by making a shift in paradigm. Upon entering the field, a concern was that the impact of vision 2020, mainly regarding the implementation of oil palm schemes, would have a vital effects on Plasu. Specially with regard to farming strategies, food pattern and the connectedness within the community. The two previous chapters have discussed the effects of commercialization on food pattern and farming strategies in Plasu. In this chapter the community connectedness based on observations, interviews and PRA's with the Plasu community will be discussed. Having in mind, that the government wants a shift in paradigm, it will be stated, that this shift is already taken place, by going for modernity, converting into Christianity and changing practises. This will lead to a discussion on the changes of the adat. Finally a discussion on the effects of this process will be presented, followed by a conclusion.

Modernity in Plasu

Modernity appears to be a common goal of the community as seen in their adoption of the palm oil schemes and their preference of market foods. According to community members and observations on them, 'modernity' is; money, education, market food, cooperation with the government and not the 'old' belief. In addition, we see it as a change from a focus inside the community towards a focus outside of the community. This focus outside of the community has been helped with improved infrastructure (construction of the road in 1993) and transportation (more cars and motorcycles), but also by getting a

new religion and a wish for education and jobs in cities. In addition it was observed that children watch much television and have posters of teenage celebrities showing a more 'modern' lifestyle.
The 'modern' way of life include the belief that `time is money´. An example on more time efficiency is the conversion from a small scale crop production to the raising of livestock.

Conversion to Christianity

"The truth is what is written in the Bible. Truth can change you, it changed me"
In 1958 the first pastor visited Rh. Beji and started an ongoing process of converting to Christianity. Crosses on the doors, pictures of Jesus and the enthusiastic attitudes towards Christianity experienced under the interviews all indicate this change. An interview with an elderly man helped clarifying why people in Plasu are changing from their traditional belief to Christianity. He stated that the importance in being a part of something that is practiced and understood in the 'outside' world is the reason he has converted to Christianity –"*at least you have a religion that everybody knows*". At first glance this move towards Christianity appears to disconnect the community, but if accepted by the whole community it is bringing them together. Nevertheless, they are still practising rituals, and making procedures linked to their old believe, but as more or less everybody is in that position, that is also connecting them as well.
Two middle aged women from one longhouse described their religious belief as in a process of "learning" as they did not believe in the old ways but would not yet call themselves Christian either.
We found that this in-between statement represent the felling within the community. A young girl who converted to Christianity when she was 12 explained:
"In this longhouse all have converted to Christianity, but sometimes the headman still does the Minning [a harvest ritual] but he also goes to church every Sunday"
These quotes exemplify the struggles most of the informants are facing under the process of convention. The young girl expressed her confusion over the shifting between the Christian believe and the old rituals.
One answer why they convert to Christianity when they still care for the traditional believe seems to find in the fact that they feel 'relieved' in a practical sense of understanding. With 'Practical' is meant that Christianity simply give the community more possibilities and make their everyday life easier. As a young girl explained, the traditional believe have so many rules and tabus that made it difficult for her. Before converting, she could not: Sing when having a meal, leave the house if she heard a Ketubung bird, eat without light etcetera.
However, the traditional adat is still somehow practised, as explained below.

Practicing adat

The social network map, shown on the picture below, is done in order to get an impression of the connectedness in another sense then the ideological, by looking on their willing to share. Sharing is a part of the adat, that are closely related to the old believe.

Adat: An un-written law, a set of behavioural norms, rules and procedures which enables Iban people to live as a community and maintain community connectedness.

Bedurock: A system of exchanging labour (e.g. farm labour) between biliks and among longhouses.

This map give the impression that the five random biliks chosen in Rh. Ayum and between Rh. Ayum and the six other longhouses in Plasu is interconnected in terms of what is shared in between, see table 18.

Table 19, Results from Social Network Map

Between longhouses:	Between Five random biliks
School	Kitchen
Graveyard	Weaving and handcraft
Oil palm	Information
Infrastructure	Tools
River	Social Gatherings
Pipe water	Work on new longhouses
Land	Land boat
Church	Labour
Marriage (listed less frequently)	
Shopping (listed less frequently)	

Sharing of land

It appears on the map, that land is shared between the longhouses and according to an interview with an elderly women, the land is shared without much hesitation. *"If people want the land from here, I just give…you take what you want"*. However this contradicts with other information gained concerning the paddy-fields and how they are organised within biliks. Nonetheless, the sharing of land amongst others things continues to be practiced.

Sharing of labour

The informants only use bedurak to a certain limit, expressed by an informant: "*because we don't have to do anything when not following bedurok*". As mentioned earlier, some informants sees the traditional believes contributing to a more difficult life-style. Nevertheless, people in Beji longhouse still plant and harvest wet rice the traditional way. They helping each other in the field and when constructing longhouses according to the bedurok system.

Vulnerabilities

The above mentioned trends towards 'modernity' are beneficial to Plasu by keeping the community on the same goal and giving practical benefits. However with the 'modernity' also comes new vulnerabilities. In this section we will approach education and migration as possible vulnerabilities and discus to potential consequences.

"The new generation have good values compared to the old generation, and they should because they are taught in school" Elderly woman, Rh. Beji, March 2008.

From observation and interviews it appears that education is both strengthen and weakened. A strength is that it encourages youth to be critical towards changes like pollution and loss of jungle, teach health as well as give job opportunities outside of Plasu. However it is also a weakend considering outward migration and the possible hindrance of the communities connectedness. But it was observed that those

who worked and lived outside of Plasu still had a great connection to the inside community. As they return home on special occasions and help when needed. For example during the rice harvesting period which was the time of this research, several workers from outside Plasu returned home to help on family land. In addition, according to the questionnaire remittances are often sent back to family members from people working outside Plasu. As mentioned earlier, the community also has a lot of shared values, that keeps them connected. And even though the values are new, the old generation support it, as the quotation also exemplifies above.

The conclusion then, is not that the new knowledge, which is seen as the only and best way towards a sustainable and happy future by the informants is actually in its worse case, the end of it. That, was not something the inhabitants was aware of. They were aware of the lack of traditionally knowledge as a consequence of school education, but did not link migration as a direct effect on school education.

Conclusion

The Ministry of land development work on '*A radical mental revolution"* according to their 2020 vision. The people within the Plasu community is being part of this mental revolution as they are changing their religion, values and practices according to the lines of vision and are heading for progress. The change in focus from inside to outside, is by the informants thought as something strengthening by helping out the existing vulnerabilities in the community, but as these analysis shows, it also gives the community new vulnerabilities to face. Nevertheless the example Christianity tells us, that Instead of seen the conversation to Christianity as a negative effect that creates forces going against the connecting ones, it is here stated that the change in life style, that comes with it, creates new values but based on the old. When the values is not only adapted but actually redefined, this might create a useful situation that benefits to the livelihood of Plasu.

Conclusions

Agriculture plays an important socio-economic role in the livelihoods of Plasuians as home gardens and paddy-rice cultivation are the main type of subsistence agriculture practiced.

Farmers have changed certain farming practices and Commercial farming, mainly from oil palm cultivation, dominates the agricultural land-use pattern.

Plasuians enjoy several advantages from Oil-palm cultivation:
Land-title security;
Economic benefits take the form dividends and contractual work;
Infastructural improvements are rendered by SALCRA in the form of roads, bridges and schools.

Commercial farming posses certain vulnerabilities to Plasu:
Forested area is being decreased;
Plant and animal biodiversity has been reduced;
More agro-chemicals are being used;
Evidence of pollution is becoming more evident.
There is an increased consumption of processed foods
The youth have less time to learn their traditional food knowledge and they can recognize fewer wild plants than the adults
The community is eager to adopt a 'modern' lifestyle.
Traditional community customs, though not as highly reverend as before, still exist and play important roles in the social connectedness.

Perspectives

Taken into consideration that this field work took place over a very limiting period of 9 days, we find it interesting to consider how we would have substantiate our results and elaborated the subject given more time. Most of the activities could have been replicated in order to make the results more scientific. An example is the listing of lunch served in the rice huts. The exact percentage of the change in food sources is a rough estimate made by only one informant. The number of informants and a better division on gender and age, could have improved the results in many cases.

Local information about diseases related to obesity and the local professional knowledge and attitude towards diets containing higher degrees of processed food would have been very useful in our discussion on vulnerabilities in the chapter on food pattern. We tried to contact the Nyabor Health Clinic to get a picture about the development of the general health status in the Plasu region. This was not possible due to restrictions in authorization and we were unable to interview the head nurse and doctor. A research project over a longer period could have applied for the permit and furthermore elaborated unto the health status and the consequences of the development in the area.

It would be interesting to see if the increase in income from the palm oil scheme is able to rise according to the increase in food prices.

Acknowledgement

We would like to thank and give a big applause to those who helped us during the fieldwork, as well as those who supported us before and after the trip. We learned a lot from you and are thankful for your critical comments, feedback and friendly understanding during difficult times.

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Appendix 1, Questionaire survay

BORANG SOALSELIDIK KAJIAN SOSIO-EKONOMI KAMPUNG PLASU
(Socio-economic survey conducted in Kampung Plasu)

Nama Penemubual (Interviewer): _____Tarikh (Date):_____ Masa (Time):_____

1. Bangsa *(Race)* :
_____

2. Agama *(Religion)* :
_____

3. Jantina *(Gender)* :
_____

4. Jangkamasa tinggal di tempat ini *(Years living in the area)* : _____

5. Latarbelakang pendidikan *(Education background)* : _____

( ) Tidak pernah bersekolah
(Never went to School)
( ) Sekolah menegah rendah (SRP)
(Lower Secondary School)
( ) Sekolah menegah tinggi (STPM)
(Higher Secondary School)
( ) Ijazah
(Degree)

( ) Sekolah rendah (darjah 6)
Primary school (Primary 6)
( ) Sekolah menengah atas (SPM/SPVM)
(Upper Secondary School)
( ) Diploma
(Diploma)
( ) Lain-lain:
_____
(Other)

6. Peranan dalam keluarga *(Role in the Family)* :
_____

7. Pekerjaan *(Occupation):*
( ) Pegawai Kerajaan *(Government Servant)* ( ) Swasta *(Private)* ( ) Petani *(Farmer)*
( ) Nelayan *(Fisherman)* ( ) Bekerja sendiri *(Self-employed)*
( ) Lain-lain *(Other):* _____

8. Bilangan dan umur ahli keluarga* yang tinggal serumah, termasuk responden
(Amount and age of the family members including respondent)

Umur *(Age)*	Lelaki *(Male)*	Perempuan *(Female)*

< 5		
6 – 10		
11 – 15		
16 – 20		
21 – 25		
26 – 30		
31 – 35		
36 – 40		
41 – 45		
46 – 50		
51 – 55		
56 – 60		
61 – 64		
> 65		

*;*Termasuk mereka yang tinggal di luar tetapi bukan secara tetap dan juga mereka yang bersekolah di luar. Mereka ini akan balik ke rumah kalau tidak menpunyai perkerjaan atau tidak bersekolah lagi.*

(include those who stay outside but not permanently and for those who studies outside kampung. Normally they will come back home if they don't have job or not studying anymore)*

9. Purata pendapatan responden sebulan *(Average monthly income):*

(a) Gaji *(Salary)* RM_____

(b) Lain-lain pendapatan *(Other income)*: RM_____

10. Apakah sumber pendapatan bulanan keluarga anda sekarang?
(What is your monthly source of income?)

Sumber Pendapatan Keluarga *(Source of Income)*	Pendapatan (RM) [Income (RM)]	
Penjualan hasil tanaman (*Income generated by selling crops)*		
□ Kelapa Sawit *(Palm Oil)*		
□ Getah *(Rubber)*		
□ Padi *(Paddy)*		
□ Sayur-Sayuran *(Vegetable)*		
□ Sagu *(Sago)*		
□ Buah-buahan *(Fruits)*		
□ Kelapa *(Coconut)*		
□ lain-lain (nyatakan) *Others (Please state)*		
Penjualan hasil ternakan *(Income generated by selling livestock)*		
□ Ayam *(Chicken)*		
□ Itik *(Duck)*		

□ Khinzir *(Pig)*		
□ lain-lain (nyatakan) *Others (Please State)* •		
Penjualan hasil tangkapan sungai *(Income generated by selling aquatic species from the river)*		
Penjualan hasil pungutan hutan *(Income generated by selling the forest products)* □ Hasil kayu *(Woods)* ☐ Hasil bukan kayu *(Wild forest products, e.g Paku)*		
Perniagaan sendiri (kedai, pengangkutan, dll.) *(Own business : own shop, transportation, etc.)*		
Duit dihantar oleh ahli keluarga yang bekerja di luar *(Money sent by children)*		
lain-lain (nyatakan) *Others (Please state)* ☐ ☐		

11. Berapakah purata perbelanjaan keluarga anda sebulan?
(What is your average of expenditure per month?)

Jenis Perbelanjaan *(Type of Expenses)*	Perbelanjaan (RM) [Expenses (RM)]
Makanan *(Food)*	
Persekolahan anak *(Children education)*	
Pakaian *(Cloth)*	
Bil air dan api *(Electricity & water bill)*	
Minyak kereta/motosikal/bot, dll. *(Fuel for car, motorbike, boat, etc)*	
lain-lain (nyatakan) *(Others; please specify)* •	

12 a. Adakah anda memiliki tanah?
(Do you own land?)

Ya (*Yes*): _____ Tidak (*No*): _____

b. Kalau Ya, berapa ekar atau plot tanah yang anda miliki? (*If Yes, How many acres or plots of land you own?)*
_____ ekar/ plot *(acres / plot)*

13 a. Dari keluasan tersebut tolong nyatakan status tanah dan keluasannya.
Please verify the land status and scale (acres)

Status Tanah *(Land status)*	Keluasan (ekar) *acres*
Native Area Land (NAL) dengan geran (*land title document*)	
Mixed Zone Land (MZL)	
Reserved Land	
Native Customary Right Land (NCR)	
Interior Area Land	

b. Adakah tanah yang anda sebutkan di atas memiliki geran hakmilik?
(Based on the land status you have stated above, do you own land title documentation?)
Ya *(Yes)* : _____ Tidak *(No)*: _____

c. Bagaimana geran hakmilik ini diperolehi?
(If yes, how did you acquire the land title documentation?

Cara Pemilikan Tanah (Issue land title documentation)	Tandakan*(Tick)* (√)
Jabatan Tanah Dan Survei (Land and Survey Department)	
SALCRA	
Pindah Milik Keluarga *(Transfer by registered proprietor)*	
Lain-lain (nyatakan) : Other (please state)	

14. Dari keluasan tanah tersebut, berapa ekar digunakan untuk:
(How many acres of land has been used for the following:)

Kegunaan (*Purpose)*	Keluasan (ekar) *(Acres)*	Jenis Subsidi (Type of subsidies)	Kuantiti (Quantity)	Agensi (Agency)
Kelapa sawit *(Palm oil)*				
Getah *(Rubber)*				
Padi *(Paddy)*				
Buah-buahan *(Fruit Orchard)*				
Ternakan *(Livestock)*				
Sagu *(Sago)*				
Disewakan *(Rents)*				
Dibiarkan: tanah paya *(Isolated Land:Peat Swamp)*				
lain-lain (nyatakan) *(Others)* • •				

15 a. Adakah senang untuk mendapatkan pekerjaan di Plasu? *(Is it easy to get a job in Plasu)*

Ya *(Yes)*: ____ Tidak *(No)*: _____ Tidak tahu *(I do not know)*: _____

b. Kalau tidak, kenapa susah untuk mendapatkan pekerjaan di sini? *(If no, give the most important reasons?)*
_____
_____
_____

16. Adakah anda memiliki alat-alat dan kemudahan rumah seperti berikut?
(Do you own any equipment and house facilities such as?)

Item	Ya *Yes* (?)	Item	Ya *Yes* (?)
Televisyen *(Television)*		Mesin pembasuh *(Washing machine)*	
Astro/ Parabola *(Satellite)*		Pendingin hawa *(Air conditioner)*	
Peti sejuk *(Refrigerator)*		Generator elektrik *(Electricity generator)*	
Dapur gas *(Cooking gas)*		Motorsikal *(Motobike)*	
Tandas (dalam rumah) *Toilet (Inside house)*		Kereta *(Car)*	
Tandas (di sungai) *Toilet (In the river)*		Perahu *(Boat)*	
Set Sofa *(Sofa set)*		Bot berenjin *(Engine boat)*	
Komputer *(Computer)*		Basikal *(Bike)*	
Iain-lain (nyatakan) *Others (Please stated)* •			

17. Tidak apakah pembangunan pada pendapat anda?
(What does development means to you?)

_____
_____
_____

18 a. Pada pendapat anda, adakah pembangunan di kawasan ini bermanfaat untuk anda dan ahli keluarga anda?
(In your opinion, does the development in this area beneficial to you and your family?)

Ya *(Yes)*: _____ Tidak *(No)*: _____

b. *(Please give reasons for your answer above)*

_____
_____
_____

19. Adakah anda berpuas hati dengan pembangunan yang ada sekarang?
(Are you satisfied with the development in the area?)

Ya *(Yes)*: _____ Tidak *(No)*:_____

20. Pada pandangan anda, adakah pembangunan ini membawa apa-apa kesan kepada jumlah penduduk di kampung ini?
(Based on your opinion, is the development bring any effect to the population in kampong)

Ya *(Yes)*: _____ Tidak *(No)*: _____

21. Adakah pembangunan memberi kesan ke atas cara hidup komuniti di sini? Pada pandangan anda.

(I has the development caused any change to the livelihood in the communities? Please explain)

_____
_____
_____

22. Pada pendapat anda, adakah keadaan sekitar kampung ini seperti air, udara dan tanah seperti dulu? Kalau *Tidak, kenapa? (Based on your opinion, Is there any changes to the environment? Please explain your answer)*

Ya *(Yes)*: _____ Tidak *(No)*: _____

Kenapa *(Explaination):*

_____
_____
_____
_____

23. Pada pendapat anda, apakah faktor utama yang menyumbang kepada pencemaran di sini?
(Based on your opinion, what are the main factors that create the pollution?)

Kilang Kelapa Sawit *(Oil Palm Mill)* ( )
Ladang Kelapa Sawit *(Palm Oil Estate)* ( )
Sisa Baja *(Fertilizer Waste)* ( )
Najis Binatang *(Animal Fasces)* ( )
Sisa Racun *(Pesticides Waste)* ( )
Pembuangan Sampah *(Garbage Disposal)* ( )
Lain-lain *(Others)* ( ) _____

24. Adakah anda merasakan bahawa penanaman kelapa sawit bermanfaat untuk anda dan keluarga anda? *(Do you think that Palm Oil plantation beneficial to you and your family?)*

Ya *(Yes):* _____ Tidak *(No)*: _____

TERIMA KASIH
o o o o o o o o o o o o O O O O O O O O O O O O o o o o o o o o o o o o

Appendix 2, List of methods applied

METHODS	NUMBER	DATA COLLECTED
QUESTIONAIRE	52	preliminary information about the longhouses
SEMISTRUCTURED INTRVIEW	30	Information about the households (qualitative understanding of the choices of farming strategies, dietary habits, norms and taboos as well as to comprehend social perceptions of the village's dynamic situation
NON- STRUCTURED INTERVIEW	20	key issues
PARTICIPATORY RURALAPPARAISAL	10 with 5-6 household	comparisons between different strata (men, women; old, young; for example)
TRANSECT WALK	5	production characteristics of Plasu with visible problems and potentials.
COMMUNITYMAPPING	Three (3) different but homogenous groups comprising 5 men, women and children	Existing natural resources, boundaries and physical elements such as important buildings and holy places
SOCIAL RELATIONMAPPING		overview of the kin-relations between biliks
TREND ANALYSIS	1	Important changes in farming practices and reasons for changes and future needs
PREFEREN MATRIX	1	Priority of different available cultivatable crops
SEASONAL CALENDAR FOR FARMING STRATEGIES	1	Variations in the diets
SEASONAL CALENDAR FOR FOOD DIARY	1	Agricultural activities performed during each month of the year
Soil and water sampling	4	The chemical parameters of the sampled soil and water
Vegetation sampling	2	An idea of the biomass and biodiversity of secondary forest compared to that of an oil-palm estate.

FOOD DAIRY	2	origin of food products, their choice criteria and potential problems in current food habits
Listing of Food Sources and Problems		Main source of food and their preferences for the future
Longhouse shop inventory	3	Available food commodities to the community.
Lunch served in the ricefield huts	1	Food habits while working outside the longhouse

Synopsis

From Subsistence to Commercial Farming in Plasu, Sarawak (Malaysia).

-Community connectedness, Food patterns and Farming strategies-

Department of Agricultural Sciences, Forest & Landscape, Faculty of Life Science, Copenhagen University (Demark)

Thematic Course in Interdisciplinary Land Use and Natural Resource Management, SLUSE Field Course

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Introduction

Malaysia is on its way to becoming an industrialized country by 2020; however the rural people, primarily land rich Iban are still living in poverty and are now facing rapid change in livelihood and farming strategies. The government has in order to alleviate the poverty implemented a number of land schemes such as SALCRA and the Joint Venture Concept (JVC) with the aim to commercialize Native Customary Land belonging to rural communities.

These development schemes have encouraged Iban communities to shift from traditional subsistent farming to commercialized agriculture (Hansen, 2005). This implies a shift from producing food crops primarily for consumption to that of cash crops for a market outside the village. This change in farming strategies is interesting because we believe that it is altering the livelihood of the small farming communities and these will be facing new vulnerabilities.

Kampung Plasu, a village located along the new Kabong-Selalang coastal road in the state of Sarawak, Malaysia, is not an exception. The Iban community of Plasu consist of six relative small longhouses with 85 households. Rumah Beji is the largest of the longhouses and will be the starting point for our research. Traditional shifting cultivation in Plasu is being replaced by rotational practise with shorter fallow periods, probably because of land use conflicts and land shortage. The main agricultural productions are wet paddy rice and rubber, but other cultivation such as pepper is given up for oil palm plantations. (ILUNRM, 2008)

The villagers have requested the government to survey their land followed by an issuance of title, but they are still waiting for that to be done. The commercial oil palm scheme by SALCRA, is supposed to grant the land to be surveyed and titled to the villagers. The large conversion to oil palm plantation may be seen as an effort to get a title over the land. Plasu is the village that seem to be most optimistic about oil palm production out of the five Malay villages that are researched doing this course (Pers. Com. Kelvin, Feb. 2008).

By comparing the changes in livelihood assets of farmers involved with commercial production, subsistent farmers and mixed farmers, vulnerabilities that come with commercialization in rural communities will be identified. Thus by analysis of the problem of more commercial crops being grown, as presented in Appendix 1 (Problem tree of Commercialization in Plasu), the five capital assets of livelihoods as described by DFID, 2000 will be used as a framework to study how commercialization is changing the way of life in the Plasu community. While all livelihood strategies are vulnerable to different trends, shocks and

seasons (DFID, 2000), it is hypothesized that the commercialization in rural communities makes the Plasu community more vulnerable to outside forces such as international markets, trends in governance and seasonality of prices and production. Furthermore, the interactions within the community, such as food patterns are also likely to change and influence the cultural values.

Consequently, the following were formulated to guide the investigative research:

Main Hypothesis:

A change from subsistence farming to commercial farming causes new vulnerabilities in the livelihood strategies of the Plasu community.

Main research question:

How does the change from subsistence farming to commercial agriculture influence the livelihood of Plasu community members, with respect to community connectedness1, food patterns2 and farming strategies3?

Main objective:

To analyze the vulnerabilities in the new livelihood strategies of Plasu community members.

---

[1] ***Community Connectedness:*** Community connectedness: A community living under the order of Adat which courses connectedness in terms of helping, sharing religion, rites and rituals and social gatherings.

[2] *Food Patterns:* Consists of 1) What is consumed, i.e. what is deemed culturally and nutritionally appropriate 2.) The food's origin: if it is grown in the village or purchased outside the village at the market.

This is opposed to food in the village which is available but which is not consumed for various reasons such as preference, habit or culture.

[3] ***Farming strategy*****:** the organization of actions which involve the inter-related matrix of soils, plants, animals, labour, tools and capital and how these factors of production are used in a holistic manner.

Planned collaboration with Malaysian-counterparts

Field research for this course will be a product of collaboration between the Malaysian Consortium for Environment and Development (MUCED), Malaysia and Copenhagen University, Denmark. Thus, there will be a merger of this synopsis with that of the collaborating Malaysian partners. This will result in comprises and modification of this synopsis to guarantee the objectives of both groups are met. Furthermore, the expertise and knowledge of the collaborators will be respected to ensure that the quality of this work is improved and in no way comprised.

Definition of Key terms

All definitions, unless otherwise stated were formulated by the researchers and are meant for sole purposes of this investigation. The following are proposed to clarify and simplify key terms, deemed important in this research.

Iban community: A village that live together connected by the terms of the Adat, kinship and that lives in the same livelihood. This can be in one or more than one longhouses in a longhouse community.

Adat: The term Adat, refers to the normative rules and understandings that makes the moral foundation for the Iban community. Adat regulate individual actions and govern relations between individuals and between the unseen supernatural and the everyday visible worlds.

Bilik: Bilik is the room where a household live. The household consists of a bilateral family.

Longhouse: One long house consisting of a number individual households/ biliks.

Longhouse community: A longhouse community is a corporate group, ritually and jurally that live in the same longhouse.

Angat: It is believed, that individual behaviour can influence on the longhouse community, by acting against the super natural and thereby create Angat.

Bedurok: A system to ensure farmers labour, by exchanging labour between households (biliks)

Menoa: the shared responsibilities of defending the territory

Competitive: The willing to compete towards other individuals in the longhouse community to gain individual achievement.

Research Questions

As the research is proposed to focus on investigating the changes in “community connectedness”, “farming strategies” and “food patterns” of subsistence versus commercial farming and try to map the community’s new vulnerabilities, key elements within these 3 main categories are presented to give a clearer understanding of the proposed research description.

1. Community Connectedness

	Hypothesis	Objective	Livelihood Asset	Sub-question	Method to obtain required data	Attention	Assumptions
Community connectedness	The commercial farming system has caused individuals in the community to become more competitive than connected	To describe and analyze social activities and thoughts, that are related to the Bedurok system	Natural capital	Which part of the harvest is shifting hands within the longhouse?	Seasonal farming calendar, semi structured interviews		Access to farmers, cookers others? That the harvest is shifting hand in the first place.
				What role does religion play in the connecting process?	Participant observation., Semi structured interviews	Identification of symbols, rituals, religious narratives	Historical documents. General information about their religion.
				Do the farmers feel successful? Which	Semi-structured		Access to farmers.

				criteria should be fulfilled in order to obtain success in farming?	interview,		Information about what success means to them.
				Do the commercialized crops have any cultural importance? And what importance?	Semi-structured interview, Literature review		Answers on many of the others sub-questions
				Which social value do land rights have for the individual farmers?	Semi-structured interview	Detailed map of the study area.	
			Social capital	Do the inhabitants from different Biliks/longhouses prepare and/ or eat together?	Participant observation Semi structured interviews	Biliks longhouses	
				Which kind of food do they eat together and why that kind of food?	Semi-structured Interview, Participant observation.		
				Which networks do people from the	Daily routine, Venn diagram		

				community join?			
				Which social activities create connectedness within the longhouse?	Participant observation Semi structured interviews. Venn diagram.		Access to places where rituals
				Is there any rituals regarding the crops/food that connect the villigers?	Participant observation Semi structured interviews		Access to places where rituals happens (bilik, longhouse, field, forest)
				Do the perception of the new changes in the society according to the Bedurok and Adat systems differ between the generations? (competitiveness/ community connectedness)	Semi structured interview		
				How do the inhabitants understand solidarity and/or Adat, Angat	Semi-structured interviews of key informants		

				Do the inhabitants consider the community as in harmony?	Problem ranking. Semi structured interview		
				What is inhabitants' understanding of well- being as express in the Adat system?	Semi structured interview		
			Financial capital	How is help between inhabitants being valued and re-paid?	Semi-structured Interview, Seasonal farming calendar.		-Standardized units of measurements are used.
				How is the Bedurok system applied? Does it have other names?	Semi-structured Interview		
				How do the inhabitants experience competition between them?	Semi-structured Interview		
				How do the farmers describe the changes in competition	Key informant with semi structured		

				between biliks and/or other farmers?	interview		
			Human capital	Does commercial farming, require more competition between the farmers and other actors? If so, how and where?	Semi structured int. and participant observation		
				Do the farmers help each other? In which ways?	Semi structured int. and participant observation		
				When do the farmers help each other and for what purpose?	Seasonal calendar. Semi structured int. and participant observation		
			Physical capital	Do the use of the physical environment create communal connecting?	Participant observation Semi structured interviews		
				What is the distance between the longhouse?	GPS mapping		

				Do the distance between longhouses influence the extend of connectedness?			
				Is the distance between the longhouse an indicator of the extend of connectedness?			

2. Farming Strategies

Based on the definition of commercialization proposed, the focus during the course of this study will be on the bio-physical and organizational diversity. Based on these aspects, 3 possible categories of farming systems will be analyzed:

Commercial plantations: owned and managed by Government and/or external (Not belonging to Plasu's Longhouses) investors with market oriented production.

Traditional farming: geared towards meeting the demands of the Longhouse/Bilick and includes hunting, food and Non-timber forest products (NTFPs) gathering from the forest, or uncultivated land.

Mixed farming: Any system which falls outside or which shows a combination of the main characteristics of the first 2 systems.

	Hypothesis	Objective	Livelihood Asset	Sub-question	Method to obtain required data	Indicators	Assumptions
Farming Strategies	Commercialized exploitation uses more natural resources as opposed to traditional agri-systems.	1. To measure the extent of natural resource use in relation to the availability of land.	Natural capital	Where (location) of the resources (land holding and forest)?	Transect walk (PRA), Community mapping, GPS, Interviews, Direct observation	Detailed map of the study area.	-There is not relocation of the villages within the last 20 years. -Resources are permanent and in-exhaustible
				What is the size of land	Semi-structured	Detailed map of	-Boundaries are

		2. To investigate and describe the role of natural resources in commercial agriculture.		holdings?	interview, GPS, Field measurement	the study area.	clear. -No conflicts over land tenure. -Instruments work accurately.
				What are the uses for land/forest?	Semi-structured interview, PRA: Community mapping, Transect and farm walks, Trend analysis and community history. Direct observation		-Land use does not change often during a month.
				How much forest area and land holdings changed in the last 10-20 years?	Semi-structured interview, Literature review, PRA: Trend analysis and community history.	Detailed timeline	-Respondents have an accurate memory.
				How much land allotted for cash crops and	Direct observation and measurement,	Detailed map of the study area.	-Respondents are reliable.

				subsistence?	Semi-structured interview		
				What are the push and pull factors that encourage commercialization?	Semi-structured Interview, Key informant interviews,		-Factors have a direct relationship to commercialization.
			Social capital	Are there any economic (government subsidies, market access), social and infrastructural (development projects) incentives to change production systems and if so what are the impacts?	Semi-structured Interview, Key informant interviews, Literature reviews,	Government policies and programs.	-Up-to-date and accurate data available.
				Is there communal forestry?	Semi-structured Interview, Key informant interviews		- There is a definite definition of community forestry within the study area.
			Financial capital	How much of the harvest is self-consumed vs. sold for income vs. shared	Semi-structured Interview,		-Standardized units of measurements are used.

				communally?			
				What is the income from your yield?	Semi-structured Interview, Literature review	Income per unit area; Price per unit weight.	-Accurate records are available. -Price fluctuations are minimal.
			Human capital	What is the amount of labor required to cultivate your land holding?	Semi-structured interview	Man/Unit area; hours/area/day	-Laborers work with the same efficiency. -Workers are not affected by external factors (sickness, etc)
			Physical capital	What environmental conservation practices are done, with regards to soil, water and biodiversity?			

3. Food Patterns

Food patterns	Hypothesis	Objective	Livelihood Asset	Sub-question	Method to obtain required data	Indicators	Assumptions

	Community members purchase more food at the market and eat a less varied diet when they are a part of commercial farming as opposed to subsistent farming.	1. To analyze food patterns as land use changes from subsistence to commercial farming. 2. To analyze the communities new vulnerabilities with respect to their food patterns as land use changes.	Natural Capital	How many different crops are grown in the subsistence fields at one time?	-Semi-structured interview -Field observation Seasonal calendar		Crops were sown with the purpose of consumption
				Which foods do the locals hunt or gather from the nearby forest?	-Transect walk -Literature review -Seasonal calendar	List of seasonal foods consumed from the forest	Wild foods are not grown purposefully but are harvested/hunted from the forest
				How important are wild foods for subsistence farmers compared to commercial farmers?	-Semi-structured interview -Individual informal conversations	The importance of wild foods & reasons	As above

			Social Capital	Is their a difference between how much subsistence versus commercial families share food?	-Semi-structured interview	List of foods shared and reasons	Food sharing is equal amongst family and non-family member biliks. Food sharing does not occur between longhouses.
				How far away does the purchased food come from?	-Interview with shop keeper	List of food suppliers and food origin	Foods in the market come from outside suppliers.
			Financial Capital	How much of the household income is spent on food?	-Semi-structured interview -Participant observation	Amount spent per week	100% of purchased food is consumed.

			Human Capital	What do children (4-12), adults (18-50) and elders (>50) eat?	-Food Diary -Semi-structured interview -Participant observation -Seasonal calendar	List of foods consumed	Food diary represents average household consumption
				Do families have enough time to prepare traditional meals?	-Semi-structured interview	Times/week traditional meals are prepared	Traditional meal: that which has been consumed regionally for an extended time period.
				How do the respondents food habits relate to their health?	-Semi-structured interview -BMI	BMI (Body Mass Index)	BMI is correlated to health
			Physical Capital				
				Is it a problem to travel to the	-Semi-structured	Location of market, cost	Respondents purchase most of their foods at

				market to purchase food?	interview -Interview with shop keeper -seasonal calendar	of travel	visited market

Methodology

In order to obtain information required, the following research tools is planned to be employed.

1: Observations: In an effort to reduce systematic bias in the data collected, interview data will be compared and complimented with observational data.

1a: Direct observation

Direct and participant observations are to be done continuously from the moment of arrival to that of departure. Aspects ranging from the landscape to social norms and body language should be noted in an effort to discover hidden confounders within the study area.

1b: Field observation

GPS and field measurements : to map relevant fields and natural and man made amenities (sources of water, forest, plantations, farming areas) to spatially view resource distribution. Slope inclination, will also be considered to infer erosion proneness.

Soil tests: to characterize the bio-physical and chemical status as accurately as possible. Soil will be sampled in different fields with different land uses (home gardens, natural and plantation forest) and farming strategies (intensive or extensive farming) to allow comparisons.

1c: Participant observation

Noting that the researchers are outsiders seeking to qualitatively, and to a lesser extent, quantitatively, understand and appreciate the study objects' complexity, such an observation affords an inside perspective that would give a deeper understanding of the studied area's way of life (village patterns, norms).

2: Interviews with key informants

As a point of departure, to obtain overall information concerning the studied area, its structure and the reality faced by the villagers, clarifying interviews will be conducted with key informants such as the head of the village or someone with an in-depth knowledge about the area to be studied.

3: Semi-structured interviews

To facilitate a 2-way communication, respondents will be subjected to semi-structured interviews to obtain information about the situation in the village as well as to obtain general information about the households (more specifically, qualitative understanding of the choices of farming strategies, dietary habits, norms and taboos as well as to comprehend social perceptions of the village's dynamic situation).

4: Individual informal conversations

Bearing in mind the informants may not always be available at most appropriate times, informal conversations will allow capturing of relevant pieces of information that maybe left out in the planned activities. It is also a source of triangulating data gathered by other methods and ensuring that the integrity of data obtained through group-based activities is reliable.

5: Participatory Rural Appraisal (PRA)

The use of PRA methods was deemed appropriate, based on the context of this investigation, as it was viewed as "a research tool that would allow the offsetting of biases of a spatial, investigation, person (gender, poor, rich, elite), seasonal or professional nature" (Chambers, 1997). The PRA methods will be used to get direct access to important local knowledge and facilitate relevant comparisons between different strata (men, women; old, young; for example) which would assist in subsequent analysis.

5a: Community and farm transects

To gain an appreciation of Plasu, in regards to physical infrastructure, topography, land-use, forest and community assets and possibly identify probable problems and potentials. Furthermore, the research team have the chance to identify and meet possible informants and will serve as an instrument to formulate and make better, new amenities to the planned investigation.

5b: Community mapping

To obtain first hand information of the area use and information of tenure and to identify agricultural problems present, the different groups would be asked to draw a map according to their own perspective of things.

5c: Farm Sketch

To generalize the characteristics of the most common types of farms in the village, to include for example land use, animals reared and cultivated crops, farmers would be asked to create such a sketch.

5c: Seasonal/Farming Calendar

All participants would be asked to characterize and identify monthly and seasonal agricultural, animal and forestry activities carried out in the village during the course of a "normal" year (without exceptional natural and social shocks). Information about crop, fruit tree and forestry cycles, seasonality of rainfall, periods of compulsory communal labour and other socio-economic factors would be the focus.

5d: Trend Analysis & Community History (Time-line)

To reveal the relevant events in the village's past and the influence these have had on development in the village, mainly the elderly (ideally over 60 years). Focus would be placed on those events that have had a direct and relatively indirect impact on local agriculture and the physical environment It may also help the investigators understand how the community group feels about these trends.

5e: Daily Routine

To be conducted between all the strata within the population frame to learn about the possible different structures in the Plasu community, with respect to religion, wealth, diet routine (time of meals), labour load etc.

5f: Problem Ranking

Allowing the informants to describe their own problems, will aid in identifying the existing "problems", as seen through the eyes of Plauians. Thus the necessary adjustments to the investigative framework, if any

need be done, would guarantee the validity of the current proposed research. Furthermore, discoveries of first-hand problems would be made.

5g: Venn Diagram

Key informants would be the main sources of information as the data they present would allow the investigators to get an overview of the different connections in between people in the society and correlations.

5h: Flow Charts

Key informants would be asked to link the interrelationships within and outside the Plasu community, in terms of agricultural systems and necessary flows of inputs and outputs and its relationship mainly on diet and communal benefits and vulnerabilities.

51: Preference Matrix Ranking

Obtains input about the preferences of the community in its use of crops, land use and other production components. Social and economic preferences for non-agricultural production, livelihood, and sex- and age-based activities amongst others are to be identified within the village.

6: Literature review

This is a relevant source of qualitative and quantitative data triangulation, as it allows the methodology and data of this investigation to be critically analysed with that of previous research and investigations.

Appendix 2 gives the timeline in which such methods are to be conducted.

Sampling Methods

In order to maximize representativeness and minimize systematic omissions, a stratified random sampling of the community will be done, whereby the population frame would be members of the Plasu community and the units of analysis, the households that make up a long-house (bilik).

To facilitate possible comparisons to check for differences in livelihoods between and within longhouses, the sampling frame would be separated into strata based on the following criteria:

Longhouse membership.

Main source of income (farmers, non-farmers, employed in commercial estates)

Type of farmer: subsistence farmer, commercial farmer, mixed-type farmer.

Age groups of the individuals.

Non-probability sampling will also be applied at the starting of the research work, by interviewing the village headman and asking for his advice to identify possible future key informants (snow-ball sampling). Though "the sample data cannot be used to generalize beyond the sample itself, because the degree of sampling error associated with the sample cannot be estimated" (Rea et al.1997) this method of sampling was deemed helpful. According to Rea et al (1997), the primary objective of this type of sampling rests in its usefulness in the preliminary stages of a research project. It is therefore planned to use such method at the start of the research to quickly generate a preliminary understanding of some of the key issues.

Soil sampling is so planned that representative fields will be selected and a simple random sampling applied to collect samples (at least 10/field) systematically. To ensure statistical integrity, replicas, of at least 3 is planned.

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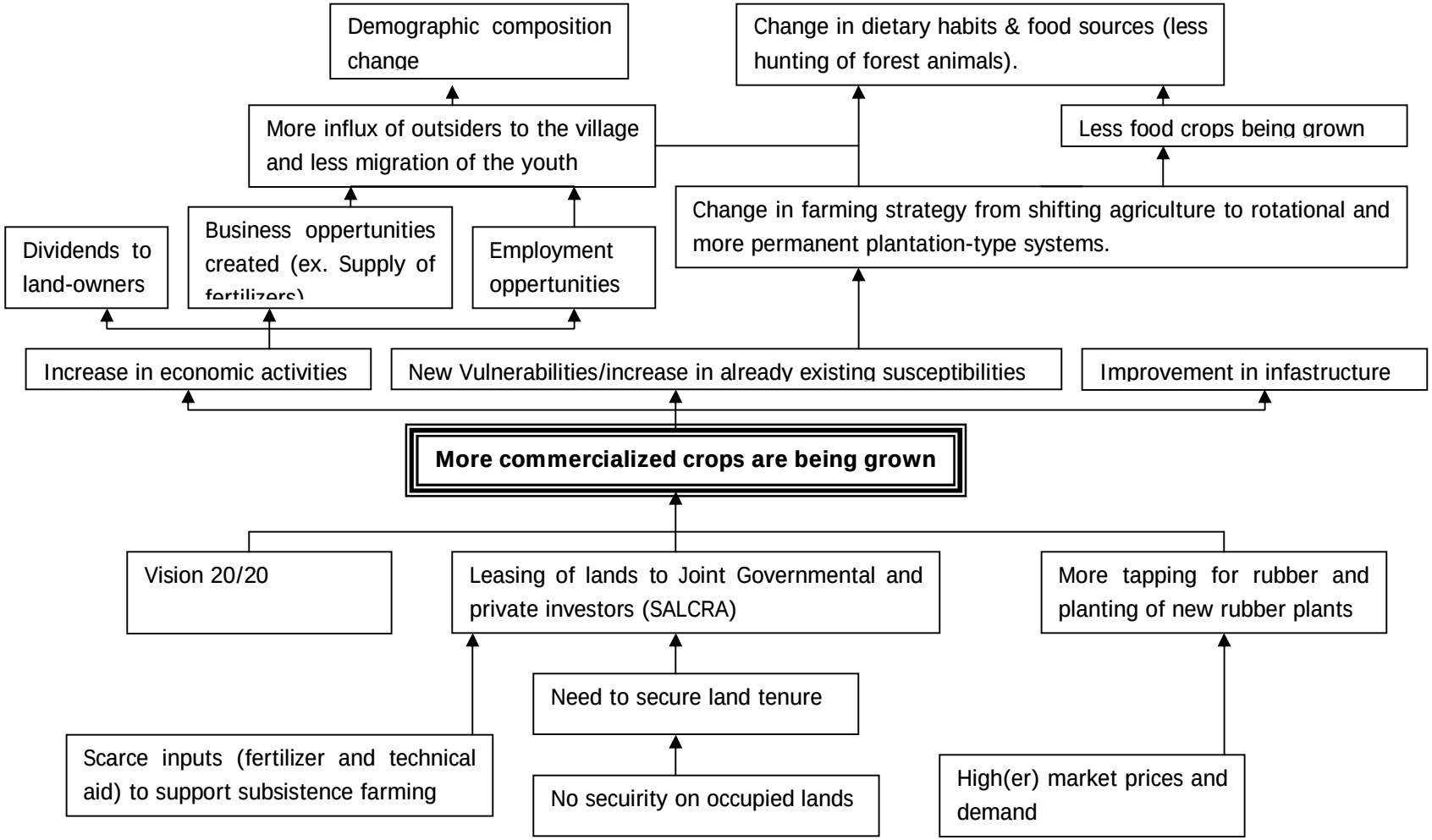
Appendix

A1, Problem analysis of Commercialization impacts in Plasu

(source of information: ILUNRM basic info, 2008)



A2, Time line of research activities

Activity	27-Feb	6-Mar	7-Mar	8-Mar	9-Mar	10-Mar	11-Mar	12-Mar	13-Mar	14-Mar	15-Mar	16-Mar	17-Mar	18-Mar
Submission of final synopsis														
Meeting with Malaysian students in Kuching														
Comparison of synopsises and development new one.														
Preparation for interview with Tr. Beji.														
Transport to field site, Plasu Village														
Informal interview with Tr. Beji (headman).														
Transect walk														
Participant Observation.														
Direct observation														
Preparation for PRA methods.														
PRA: Community mapping, Daily Routine, Time-line, Preference Ranking,														
PRA: Venn Diagram, Flow Charts, Seasonal Calendar/Matrix Ranking														
Semi structured interviews with key informants.														
GPS; Soil tests														
Debriefing, what is done, what is														
Field measurements														
Preparation for presentation and Summing up, what information														
Community meeting, presentation of findings and good-bye party.														
Data transcription, processing and analysis														
Complementary data collection and literature review														
Dairy writing														

A3, Overall Interview guide

To begin the interview:

1: Greetings (make sure you do it proper).

2: Giving ethnographic explanations.

Give project informations

Give question explanations

Give record (if so) explanations

Give native language explanations

Give interview explanations

3: Asking ethnographic questions

Ask descriptive questions

Ask structural questions

Ask contrast questions

4: Assymetrical turn taking

5: Expressing interest

6:Expressing cultural ignorance

7:Repeating

8:Restating informants terms

9:Incorporationg informants terms

10:Creating hyphothetical situations

11:Asking friendly questions

12:Taking leave- thanks.

A4, Interview guide for Community Connectedness

This is to be seen as examples on questions that could be used in a semi-structured interview.

What will be our key informants?:

The key informant to the questions regarding farming will be the farmers, but people in the household that helps the farmers, can also function as key informants. The key informant regarding food will be the women that prepare the food, but people in the household that helps the women, can also function as key informants. Many of the questions can go to both sides of the key informants, which mean the farmers and their wife.

Connectedness:

Is there something in the community that makes you feel as a part of it?

What do you like about your community?

Is there something that has changed in the community recently?

Can you describe a social activity that made you feel a kind of connection with the rest of the individuals in the longhouse (farmers, women, elders, youngsters?).

What is the distance between the longhouses?

Is there a reason why there is this distance? What?

Is the distance an obstacle? Describe why it is so.

Land use changes:

What is the procedure to get to own land?

Are there some new changes in the community? Explain what? What have changed for you in your everyday life?

What is the difference between now and 10 years ago?

Adat:

Do you feel that the youngsters/elders/farmers have another understanding of the new changes in your village?

What does Adat mean to you?

Is your community in harmony? What makes it that? Why not?

Explain a scenario, where the community was not in harmony. What happened?

What makes your well-being?

What is the opposite of well-being?

Religion:

Is there anything in your religion that makes you feel connected to your family, longhouse, the village? Explain.

Can you explain the connection between your religion and the crops you are growing? What about the new crops such as oil palm?

Do you have any rites or rituals that include food/ crops?

Land tenure problems (menoa):

What land do you own? What territory is yours?

Does it have a special meaning to you?

Is there land you would like to own? What does that mean to you to own land?

Is there any thing that is a tread for your existence as a farmer?

Bedurok:

Do you use materials that are not yours,

Do your family buy or get harvest from the other farming families?

What is your understanding of Bedurok, other name?

Do you recognize some changes in that system for the last years? Why is that and how does it show?

When do you act in relation to the Bedurok system?

Is there someone in the community that you think don't live up to the rules of Bedurok?

Do you get replayed for the labour you put into other farmers activities?

Is anyone helping you? How do you thank them for their work?

When do you help other farmers? For what purpose?

Farming strategies:

Describe success in the farming

Describe an episode that made you feel successful.

What is needed for you to achieve success in your farming? Do you need help from family, friends, officials, others?

Do you feel that you have competition? From who? What kind of competition?

Has there been any new changes in the competition recently?

What is a bad farmer? What is bad farming? What is a good farmer/ farming?

Food patterns:

Do you prepare/ eat food together with people from other biliks/longhouses?

What food, does it have a special meaning? Some occasions?

Networks:

What networks do you join?

A5, Interview guide for Food Patterns and farming strategies

Overall Hypothesis:

Community members purchase more food at the market and eat a less varied diet when they are a part of commercial farming as opposed to subsistent farming.

Overall Objective:

1. To analyze food patterns as land use changes from subsistence to commercial farming.

2. To analyze the communities new vulnerabilities with respect to their food patterns as land use changes.

Natural Capital

Hypothesis: Those who have a large variety of crops spend less money at the market.

How many different crops are grown in the subsistence fields at one time?

What food crops are you currently growing on your fields?

What other food crops did you grow in the past year on your fields?

Which foods do the locals hunt or gather from the nearby forest?

Transect walk with key informant

Hypothesis: Subsistence farmers value wild foods more than commercial farmers.

How important are wild foods for subsistence farmers compared to commercial farmers?

Do you hunt or gather foods from the nearby forest?

If yes, which foods?

When do you harvest these foods?

How much do you harvest?

How important are these foods in your diet for your nutrition, for your happiness?

Very Important b. Important c. Not that important d. Not important at all

Social Capital

Hypothesis: Subsistence families share more food.

Is their a difference between how much subsistence versus commercial families share food?

Do you ever share your food crops or your purchased food with other biliks in your longhouse?

If yes, when (shortage, harvest time…) and why?

Do you ever receive food crops or purchased food from other biliks in your longhouse?

If yes, which foods?

Hypothesis: Most purchased food does not come from Borneo.

How far away does the purchased food come from?

Read labels of foods consumed on a regular basis and find out where it comes from.

Interview with shop keeper:

Who supplies you with the food in your market?

Where does this food come from?

Have you ever had problems receiving the food that you ordered?

If yes, when and why?

Is this of concern to you?

Financial Capital

Hypothesis: Commercial families spend more money on food, subsistence farmers purchase food during low production periods.

How much of the household income is spent on food?

How much money did you spend on food last week?

Approximately how much of your cash income goes towards purchasing food?

Do you purchase more food at certain times of the year?

If yes, when?

Is it a problem to travel to the market to purchase food?

How often do you travel to the market?

How do you get there?

Are there times in the year when it is more difficult to travel to the market?

When is this?

What does it cost to travel to the market?

Is this a problem?

Human Capital

What do children (4-12), adults (18-50) and elders (>50) eat?

Respondents fill out food Diary 3x to get 'average' week

Hypothesis: Subsistence families prepare traditional meals more often.

Do families have enough time to prepare traditional meals?

How much time do you spend on average preparing your meals (morning, afternoon, evening)?

Has this increased, decreased or remained the same compared to 5 years ago?

How many times a week do you prepare traditional meals?

Has this increased, decreased or remained the same compared to 5 years ago?

Hypothesis: Those who purchase more food have a higher BMI

How do the respondents food habits relate to their health?

Do you feel that you are in good health?

If not, for what reason?

Measure respondents BMI & compare with Malaysian standards

Physical Capital

Is it a problem to travel to the market to purchase food?

Where do you purchase your food most frequently?

How far is this market

How do you travel to this market?

Does this travel method change throughout the year?

Interview with shop keeper

How long have you owned & operated your shop?

Do you feel that your customers are purchasing more foods today than they did 5 years ago?

Do you feel that your business is doing better, the same or worse than 5 years ago?

For what reasons?

Which foods do you always have in stock

What are the most popular foods purchased at your store? (check nutritional content & origin of foods indicated)

Who is your food supplier?

Do you know where they get the food?

Have you seen a change in food trends in the past 5 years?

If yes, what type of change?

How much does a regular customer spend on average per week?

Does this amount change throughout the year?

What time of year do you receive the most sales? Why?

A6, Interview guide for Farming Strategies

Natural capital

How much water and fertilizer is utilized by cash crop?

Yield and cost of cultivation of cash crop……

Input and output regarding land size…….

Financial capital

What are other sources of income?

Is there any loans for integrated farming system? Or availability of loans

Is integrated farming system practiced? If so what are they……..

Source of income during lean period?

Source of capital for input activities during farming?

Human capital

Due to migration, labour is scarce, what is alternative source of labour?

If labour availability is less what is choice of crop?

Physical capital

What environmental conservation practices are done, with regards to soil, water and biodiversity?

Market facility and information for produce?

Transport facility?

Communication facility?

Food Diary Morning Foods consumed	Amount
Afternoon Foods consumed	Amount

Evening Foods consumed	Amount
Did you eat any foods from the forest today? If yes, which ones:	

A8, Background for the questions about Adat, well-being and Bedurok

"The commercial farming system has caused individuals in the community to become more competitive than connected"

This sentence illustrates our interest to analyse if the changes in the Ibans farming strategies are changing the essence that make the Iban community a connected community, namely the Adat. The Adat may be fading away in the process of commercialization, what Eric C. Thompson calls it urbanisation of the rural community, by referring to migration and the change of identity in the country side of Malaysia (Thompson 2007).

We will define some of our key words to understand the hypothesis in greater detail.

For the Iban, it is the Adat above all, that embodies universal order. In its most general sense, the term Adat refers to the normative rules and understandings that regulate individual actions and govern relations between individuals and between the unseen supernatural and the everyday visible world. Hence, Adat includes behavioural norms, rules, procedures and injunctions. By that, Adat creates and determines the moral order that, as they assume themselves, makes Iban people able to live as a community. What is also important to understand regarding our study is that every longhouse is an Adat community.

Traditional Iban culture highly values independence but is at the same time balanced by mutual economic and ritual interdependencies. This is expressed in obligations of kinship and community; as demonstrated in the shared responsibilities of defending the territory which they call mantau menoa. The Bedurok is a system to ensure farmers labour by exchanging labour between households (biliks) (Cramb 2007) and this will be our project focus. We expect that personal independence and need for individual achievements is more dominant in the community as commercial farming requires more competitiveness. Consequently the balance between independency and interdependency must be disturbed.

The Adat subscribe continued well-being of those who adhere to the set of regulations.

Well-being can be understood as a state of social harmony and is determined by health, fertility and material wealth of the community members as well as the condition of their crops and their natural surroundings. Any serious violation of the Adat law is said to threaten the well-being and endanger the moral order in the community and their relations with the natural and unseen worlds. Serious breaches of Adat make the community vulnerable to shocks such as spiritual attack, social disorder, crop failure, flooding etc., a situation which is referred to as angat, a kind of destructive power that weaken the Iban community (Cramb 2007).

In order to identify new vulnerabilities that rise with the change of land use, we will encourage the inhabitants to define the words Adat, angat, Bedurok and menoa and explain their meaning. We will ask about the locals' well-being to get a sense of how changing farming strategies affects the social aspects of the community with a focus on the Bedurok part.

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