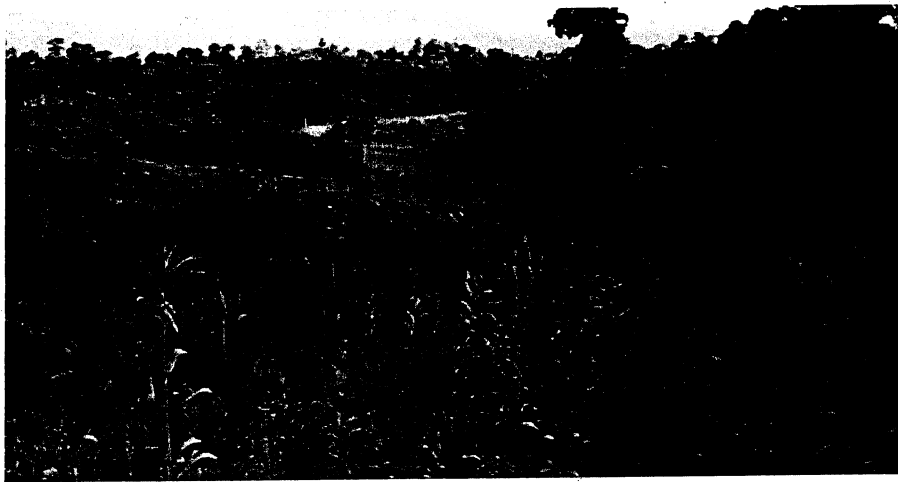


Agriculture and livelihood strategies in Rumah Muyang

SLUSE field report
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This project is dedicated to the memory of Chiu Ping Swee, who tragically died during our stay in Rumah Muyang but who is not forgotten. Our thoughts go out to his family and friends.

Abstract

The objective of this study is to look at the changes in agriculture and livelihood strategies in Rumah Muiang. Another aspect is to determine the degree of intensification in the study area, and evaluate the environmental impacts of current land use. Through household surveys, semi-structured and different PRA-sessions it is concluded that most households are working from diversified livelihood strategies with off-farm work as the primary income activity. Reasons for working off-farm is found to be related to perceptions of tradition for periodical migration, land insecurity, higher earnings and higher development opportunities in off-farm work. The manifestation of this development has been a general disintensification, with possible intensification taking place on a small percentage of the land. No conclusive answers were obtained through soil sampling and direct qualitative assessment, as to the environmental impact by different farming practises.

Keywords: Rumah Muiang, livelihood strategies, land use change, intensification, environmental impact.

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TABLE OF CONTENTS

<u>INTRODUCTION</u>	1
<u>THE STUDY AREA</u>	2
<u>METHODOLOGY</u>	3
SURVEYS	3
EXPERIENCES	4
SEMI-STRUCTURED INTERVIEWS	4
EXPERIENCES	5
PRA-SESSIONS	6
THE USE OF INTERPRETER	7
NATURAL SCIENCE METHODS	7
PROCEDURE	8
CONSIDERATIONS ABOUT NATURAL SCIENCE METHODS	9
<u>RESULTS AND DISCUSSION</u>	11
LIVELIHOOD STRATEGIES IN RUMAH MUYANG	11
LAND USE	14
LAND DISTRIBUTION	16
LAND USE AND LIVELIHOOD STRATEGIES	17
IMPACT ON THE ENVIRONMENT	19
SOIL	21
GENERAL IMPACT ON THE ENVIRONMENT	22
GENERAL DISCUSSION	23
<u>CONCLUSION</u>	25
<u>FUTURE PERSPECTIVES</u>	26
<u>REFERENCES</u>	27

Introduction

This project is a result of a SLUSE field trip to Kuching and the Niah district in Sarawak, from the 13th of October to 4th of November 2000 in Rumah Muyang.

During the last two decades, Malaysia has gone through a rapid economic development, and there has been a transition from dependence on primary products to a more diversified economy with a vigorous industrial sector. The development process started in the Peninsular Malaysia during the 1970s and was later expanded to East Malaysia. In the beginning Sarawak, was less attractive to industrial investors primarily because of their location, limited infrastructure and higher costs (for example on electricity). Today, the development is also taking place in Sarawak because the Federal Government recognized the need for an improved infrastructure and the road grants were raised. The construction of roads has made it possible for rural people to seek temporary or permanent off-farm employment to increase their income (Kaur, 1988; King, 1993b). Despite the development, the primary exports are still important and have a large share of the economy in Sarawak. The most important products in Sarawak have been the natural resources like timber and agriculture,

This development has also happened in the Niah area. The fieldwork was carried out in Iban communities, which constitute the largest ethnic group in Sarawak (Cramb & Reece, 1988). Within these development trends, Ibans has also experienced a great change in socio-economic, political and cultural relations. The response from the longhouse communities to this development has been varying.

Introduction to markets had lead to a considerable land use change and for instance the areas logged has increased during the last two decades (King, 1993a). Large areas have been commercialised and developed into oil palm plantations and the traditional subsistence agriculture has changed towards an increased use of cash crops.

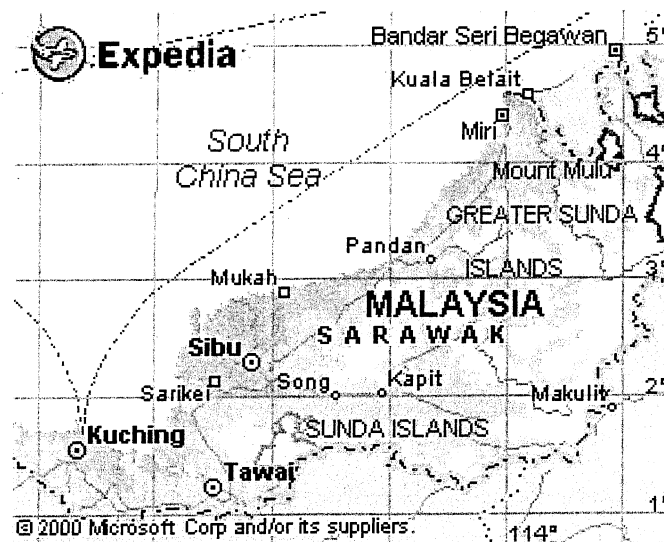
The objective of the study has therefore been to look at the changes in agriculture and livelihood strategies due to this development.

More specifically the aim of this project is to chart the different livelihood strategies pursued by the people of Rumah Muyang

Also we want to determine the degree of agricultural intensification in our study area and to evaluate the impact of current land uses on the environment

The Study area

Rumah Myang is a traditional Iban longhouse situated next to the Niah River and about 11 km from the nearest town, Batu Niah. The closest larger city is Miri 200 km north of the Rumah Myang. The longhouse was first established in the 1960s and was rebuilt in the 1980s. The longhouse has been divided into three longhouses during the years due to internal disputes and today the village consists of 40 households. A result of this division is the land is scattered in a large area because the people who left Rumah Myang kept their land. The fields are mainly small and the topography is hilly. The first sign on the development was the construction of an improved trunk road to from Miri in the 1980s. Later the development has brought electricity to the longhouse and water supply is expected within the next few years. Next to the village is the local school, which has pupils from primary 1 – 6. After primary 6 the children will have to go to Batu Niah or boarding school.



Figur 1: Sarawak (Expedia maps)

Methodology

Structured household surveys with the majority of households in the village were our initial information gathering technique. This was supplemented by open-ended semi-structured interviews both on individual and group basis, which again were supplemented with a range of PRA (Participatory Rural Appraisal) sessions. These included observational walks, physical mapping and matrix scoring.

As natural scientific methods we chose to use both qualitative and quantitative techniques for data collection. When trying to examine the ecological impact by different cropping systems we conducted soil sampling and combined it with qualitative assessment on soil and land.

The problems we encountered in deciding which methods to use were partly connected to the short amount of time in which we had to complete our data gathering. Another aspect that made it difficult to choose our methods were the fact that we did not have a lot of information about the area where we should conduct our research or about Iban communities in general. Thirdly it was a matter of us wanting to try as many different methods in the field as possible and get first hand experience with methods, which we could use, in our further academic training. This of course had to be balanced with the fact that we were supposed to obtain useful data. On top of that we had to take all these issues into consideration and combine it with thoughts about the best way to utilise our academic resources in order to fulfil our research objectives. With two social science students and one from natural science it was a matter of trying to balance the different scientific approaches.

In this chapter there will be a presentation of surveys and semi-structured interviews and our experiences with them. After that our experiences with PRA will be discussed and the last section of this chapter contains presentation and experiences gained from working with natural scientific methods.

Surveys

The idea with the household survey was to obtain quantitative data from all the households in terms of the size of household units, educational level, residential status, income generating activities, size of landholdings, ownership and crop choices as to establish the importance and degree of agricultural activities compared to off-farm activities (see survey questionnaire appendix 1).

From the beginning the main problem encountered was related to the fact that our Malaysian co-students was planning to use very lengthy formal questionnaires to generate quantitative data. In this sense they were operating from a strategy where the contents of the interviews are standardized prior to the fieldwork (Casley&Cumar, 1988)

Experiences

In the first five surveys all group members were present due to different considerations. Firstly, the aim was to discuss problems and approaches after the survey. Secondly, because confirmation was needed to ensure that both the Malaysian group and ours got the data needed. Due to our similar research objectives, it was possible to keep the sessions short and structured. After having done the first surveys together in the same bilek (=apartment in longhouse), three groups were formed that went to each bilek in the longhouse. This was done because we felt that the informants, that were mainly women, would relax more in their own home. It was a way to introduce us to the community, which is crucial as outsiders. Besides that, we also wanted to make observations about the wealth of the households and generally get a feeling about the person we were dealing with. Working in small groups also meant that the risk of intimidating the informant was reduced. These considerations were also taken into account during the semi-structured interviews. One of the biggest difficulties encountered was the fact that a lot of the women at best were not sure about land sizes and use of chemical inputs or worse, did not have any idea. We also experienced in some instances that there were discrepancies between the data gathered in the surveys and the information collected from the semi-structured interviews. This margin was sought minimised by crosschecking.

After 20 surveys informants were selected that could be representative for all the people in the longhouse and which could be interviewed in-depth doing qualitative research interviews. In total 32 households out of 40 was covered in the survey. The remaining either did not want to take part in the investigation or were not a home during our stay.

Semi-structured interviews

The reason for using qualitative research interviews are with the words of Steiner Kvale to obtain, “ *Qualitative descriptions of the life world of the subject with respect to interpretation of their meaning*” (Kvale, 1996:124). Semi-structured interviews were chosen for qualitative interviewing. It is an informal way of interviewing people in the sense that you work with an interview guide instead of questionnaires, enabling the interviewer to probe and follow up unexpected information without having to

cover all issues in every interview. The interview guide ensures some consistency in your questions (see appendix 2 for interview guide).

The strategy was to chart different livelihood strategies and see what that meant for the agricultural use of land but also to look at the reasons and motives behind these strategies.

As stated earlier, the information gained from the survey helped identify respondents for the semi-structured interviews. It was considered important to interview people with different background according to: age, gender, occupation and wealth to see if their strategies varied.

Experiences

15 semi-structured interviews were conducted from the above-mentioned categories to get a clearer picture of the socio-economic, political and cultural dynamics at work in the longhouse. The interview themes were the same for all the interviews with the exception that the interviews with farmers, tended to be longer because specific questions about agricultural practises had to be asked.

When conducting these interviews, one person was interviewing and another was taking notes. If there were more people, they also took notes and helped the interviewer in asking the questions. With this method the interviewer was able to concentrate on having the personal contact with the informant. The interviews were mainly conducted in the longhouse although some of them took place in the field when asking questions to a farmer. This was done out of the consideration that probably any farmer in the world feels more at ease when he or she is in the field. This approach also made it possible to cross check some of the information given and also enabled the interview to see what the informer was referring to. Another benefit was the fact that more detailed questions could be asked, questions that we probably would not have thought of otherwise. Each setting had positive and negative implications. After each interview, the informers were asked if they had any questions. This was done as a courtesy but it actually often opened up for more informal talks where additional information was gathered.

Another approach that was tried with success was group interviews. Lessons on the importance of creating a pleasant atmosphere were learned from these experiences. Some of these interviews tended to be more participatory because they turned out to be a kind of group discussions. In this sense these interviews were even more successful than the 'normal' ones' because the interviews turned out to be a bit more than just retrieving information but actually sharing and discussing it.

Furthermore the agricultural extension officer in Batu Niah was interviewed. At the end of the fieldwork, interviews with the headmen of two other longhouses were conducted as a way of comparing the data collected from Rumah Muyang with others to see how the trends observed corresponded to the general picture in the area.

PRA-sessions

As part of finding suitable places for an examination of the impact on soil of different land uses and to get a general overview of the area, participatory mapping was done. The observational walks had left us a bit confused as to which land belonged to which longhouse. The PRA-mapping helped to ask questions about who owned land, how much and where. Besides, the information gained from the interviews could be checked against the map and at the same time it was a great way of visualising the area. But it was also a way of seeing what was important for the people in the longhouse to have on a map.

Men of different ages and different levels of education did the mapping. Before the session we were worried that we would experience problems in making clear to them what we wanted but as soon as they were given a pencil they started drawing. One man was drawing while the remaining 2-4 people with the oldest, Aki grandfather in the lead, discussed what should be where and how much. The result was a map that covered the area with roads, rivers and positions of the other longhouses. The fields belonging to Rumah Muyang were drawn and marked with symbols relating each field with a specific crop. Fallow fields were not drawn.

The idea behind the mapping, which was to let the informants themselves take charge, worked very well. And besides the useful information gathered from the map it was clear that they took great pride in producing this map and had great fun at the same time. Actually, they insisted of drawing a second map, which basically was the same map but more neat (see appendix 3).

Another PRA-method used was the matrix scoring and compared to the physical mapping the difficulties met were greater. In advance a matrix had been made in which the people should try and relate advantages and disadvantages of each specific crop to other crops, for example capital requirements, labour input. However while applying the matrix score we realized that too many details produced confusion and that our Malaysian counter-students did not understand it any better than the villagers. It stands as a great testimony of academical nonsense on our part.

The use of interpreter

In general, working with an interpreter is an important factor when conducting fieldwork. Although most of the interviews were done very much to our satisfaction we experienced some difficulties. Especially in the beginning it became clear that more effort should have been put into explaining both our specific questions but also the general object of our study, to the interpreter. A few incidents occurred where the interpreter did not herself understand the questions and on other occasions we would certainly have benefited from discussing key concepts, that were difficult to translate into Iban. Then the resources of the interpreter could have been utilized fully and enabled the interviewer to pose questions through words that were understandable to the informant.

Another factor that influenced the interviews were due to the fact that both interpreter and we did not have any prior experience in translation or interviewing. Working with a young female interpreter, we on our part could have done more to make her feel comfortable, reducing the pressure, that she might have felt due to her lack of experience. On this key, other factors that influenced her abilities and involvement were on issues on age and gender. The fact that some of the Malaysian students were men twice her age and with a high degree of knowledge about Iban communities and language made her, in some instances when they were present, very reluctant to participate. In these situations the translations was done by some of the Malaysian students who generously played the role of interpreters and some times interviewers at the same time.

Whether the translation was done by our interpreter or our co-students they served as good facilitators creating an atmosphere of confidence where even sensitive questions on issues of political power, wealth and gender, were answered openly and we did not feel although we cannot say it with any certainty that any important information was left out.

Natural science methods

In order to evaluate the impact of certain agricultural practices on the quality of the soil, soil samples was taken combined with qualitative measurements of fields. These two approaches was to give an idea of the nutrient status of the fields and a general insight in how different land use practices affect the environment.

For the quantitative measurement the plant availability of certain macronutrients was measured. PH was also measured. The soil pH is a major factor in determining the availability of nutrients in the soil as it affects the solubility of ions in the soil and the biological processes (Lambers et al. 1998). The electrical conductivity of the soil is an indication of the salinity of the soil. Too much salt in the soil will cause a decrease in plant growth.

Some of the parameters used in the qualitative measurements were soil texture and organic matter content of the soil (SOM). The organic matter content is often very low in tropical soils due to the rapid mineralization. It is an important parameter as organic matter in the tropical soil often has the main cation exchange capacity (CEC) which helps to maintain the nutrients in the soil and SOM also influences among other things the soil structure (Kleinman, 1996; Doran, and Safley 1997)

Procedure

The area chosen for the soil sampling was found by participatory mapping. It was located around twenty minutes drive on gravelled roads from Rumah Muyang. It was an area very intensively used and was particularly chosen because of the variety of land uses very close to each other. For our investigation 3 fields were chosen: pepper, hill paddy, and fallow. The samples were taken from hills that all radiated from the same valley.

The history of the fields sampled was gathered through interviews and field observations.

From each of the 3 fields 30 samples were taken, divided into two composites. The samples were taken along transects and the 2 composites in each field were taken opposite each other around 30 cm on each side of the transect. The composite was composed of samples from both sides of the transect. This was done to randomise the sampling as much as possible. The distance between "sampling stations" was determined by the length of the transect and varied from 3 to 6 meters. In the two cultivated fields the sampling was done along zigzag transect whereas in the fallowed fields the transects were V-shaped due to the difficulties involved in sampling in the more dense vegetation.

The sampling was done around the same distance down the hills and at places where the slope was the same in the different fields. This was done to minimize variation in as many factors as possible. The samples were taken to a depth of 20 cm with a soil auger. Each composite was mixed and 1/4 of it was brought back to the longhouse for further analysis.

The composites were air dried over 6-8 days, crushed and sieved. The composites were tested for nitrogen (ammonium and nitrate), phosphorous, and potassium with the Kasetsart University Soil test kit (duplicate determination)(see test kit for description of the different procedures). Soil pH was measured in a 1:2,5 soil: water suspension with an Oakton Pocket pH-meter.

The nutrient test kit measured in the range very low-very high and to ease the presentation these values have been scaled from 1-5 and the average of the duplicate determination has been calculated. Also the values for the different nutrients have been put in the same figure. This does not imply that the nutrients can be compared within the fields as the analysis of the nutrients is based on different methods and different colour charts.

The qualitative assessment was done on 12 fields, mostly hill paddy and pepper. From each field one or two soil samples were taken at random. This was done to evaluate the soil texture. The colour of the soil was used to evaluate the content of soil organic matter. The general condition of the fields was also evaluated in terms of signs of erosion (gullies, lack of topsoil etc.), vegetation coverage and presence of pests.

Considerations about natural science methods

The reason why these particular fields were chosen was simple. It was considered that the fields sampled, should be situated close to each other to eliminate errors as much as possible, due to differences in basic soil quality. At the same time it was found necessary to sample fields that were markedly different so it would be easier to see any potential difference in soil quality with the available equipment. Between hill paddy and pepper there is also the dichotomy of traditional subsistence cultivation versus the cultivation of a cash crop. The difference between the uses of soil for one year whereafter the soil is abandoned and permanent farming was thought interesting to investigate in a quantitative manner.

The fields were chosen to be representative. From interviews and qualitative data from other fields, the selected fields was found to have many similarities with other cultivated areas in terms of chemical inputs, slope, and land use practices. Likewise, the pepper field used was not newly planted nor was it very old and the hill paddy was cultivated after a fallow period of average length.

One of the difficulties working with natural science methods is the logistic problem of getting data that are statistically valid. It is essential to have many samples and replicates of the different treatments, which of course is very time consuming to obtain and analyse. From the beginning it was realized that our quantitative data

obtained with soil sampling could not fulfil these requirements for scientific validity due to time constraints

With this in mind the soil sampling was restricted to one area only and only one field of each type were sampled. This approach was chosen to get enough samples from the selected fields to obtain data that is valid in a comparison of the fields. Had fewer samples been taken with no replicates but on more fields, variations in the results could be ascribed purely to chance. Of course with the approach chosen it is impossible to draw any absolute conclusions about the soil quality of the different types of fields in general. This constraint in the quantitative work was also the reason why direct qualitative assessment of the soils was done as more fields can be covered. Also the broader focus of qualitative assessment of soil and vegetation gave us a more complete picture of the impact of different land uses.

The data compared are from fields on different sides of a valley and it is therefore necessary to take into considerations if that has any importance. The erosion due to gradient should be the same as the fields had about the same slope and were sampled the same distance down the hills but other factors such as wind, mineralization, precipitation might varies and influence the soil differently on the different hill sides.

Sources of error

Concerning the methods used we encountered several difficulties. To use the soil nutrient test kit the soil has to be dried beforehand. This was not very easy despite the fact that we tried to keep the soil under shelter. We cannot eliminate the possibility that there has been leaching of minerals from some of the soils during a heavy downpour one night. The soil most affected seemed to be the hill paddy composite 1 that was soaked. This error can have affected the data obtained from the soil nutrient test kit.

The soil nutrient test kit and the pocket pH-meter are equipment used on location and as such we found especially the pH-meter useful. As for the nutrient soil test kit it would have been easier to use had the differences in nutrient content between the soils been greater.

Results and discussion

Livelihood strategies in Rumah Muyang

When trying to determine and understand the allocation of resources such as time and labour to a range of different activities, the concept of livelihood strategies can serve as an analytical framework. This can be done on an individual, household or community level (Mertz et al., 1999). The analytical tool used in this project is the household unit, which serves as the foundation for understanding livelihood strategies pursued by the people in Rumah Muyang.

In overall, the majority of the household include individuals that can not be designated to the spatial unit of Rumah Muyang, due to either short-term or long-term migration, but who is still included in the household as members. This is related to the dominant trend in the village where most household economies are depending mainly on income generated from off-farm activities. The household economies of Rumah Muyang therefore often cross spatial boundaries and are thus dependent on income generated in urban areas hundreds of kilometres away in Miri or Kuching. A distinction is made between households involved in in-situ or ex-situ off-farm work. By in-situ is meant that individuals work off-farm but reside in the longhouse on a daily basis while ex-situ is meant as category for those people not residing in the longhouse on a daily basis but contribute to the household economy. This categorization should not be understood too rigidly since the boundaries in reality are fluid.

The majority of the household has individuals that are occupied in ex-situ work, and at the same time maintain a second household in urban areas. So to designate one person to one household is difficult, but rather one should speak of multiple homes.

The reasons and motives for seeking employment in off-farm sectors, mainly in semi-skilled positions like truck drivers, bus drivers, sweepers or craftsmen can be explained as a need to generate enough income as to preserve and consolidate existing social arrangements in the rural longhouse. Some household are also able to accumulate capital, which are used to make structural improvements of the household in the future or to buy capital goods. The people occupied in these off-farm activities are usually males between 16-45 with 9-12 years of school.

The women employed off-farm were mainly in-situ workers with jobs as sweepers and bus drivers.

Age	Male %			Female %		
	Other	Farm	Off-farm	Other	Farm	Off-farm
17-26	25	38	38	13	75	13
27-36	19	19	63	-	100	-
37-46	-	25	75	-	20	80
47-56	17	50	33	-	80	20
57-66	-	25	75	-	100	-
67+	67	17	17	67	33	-

Tabel 1: Income generating activities of Rumah Muyang

The group classified as “Other” consisted mainly of retired people or people under education.

Besides the fact that most households are working from strategies where off-farm work is integrated in order to generate higher earnings than farming can provide. Cultural factors also play a role in these choices. In Iban societies there has been a long history of migration as a way of gaining experience (Mertz et al., 1999; Jabu, 1988) and this seems to be an important factor influencing individuals choice of working outside the longhouse and farming. It is believed by many, that future development opportunities are higher in off-farm employment although farming are by all members in the longhouse valued as important for Iban tradition and culture and for future generations.

Important reasons for not solely depending on agricultural production are numerous. One is mainly connected to the insecure land tenure situation of the Ibans. A serious of incidents were local people in the area has had their land expropriated to logging companies or oil palm companies and has been left with poor compensations at best, has created a situation were villagers feel reluctant to solely invest and work as farmers due to the increasing land insecurity. Also, for the majority of household the land size and site-location of their land makes it hard to focus on farming as a main income generating activity. Besides all these economical and political factors influencing household livelihood strategies, farming with its inbuilt natural insecurities, like flooding and diseases, cannot compete with the security that a steady paycheck means to household economies.

Besides the majority of people from household that work off-farm, there is a smaller minority of household working off-farm in-situ, which enable them to stay at home in the longhouse or at least be home in weekends. The household with individuals doing in-situ off-farm work, usually as semi-skilled truck drivers for logging companies or in a near by quarry are usually reluctant at this time, either due to small children or because they value life in the longhouse too much, to leave for purely economical reasons. The extra economic surplus that can be made from ex-situ off-farm work is sometimes not big enough to create an incentive for working ex-situ or migrating

more or less permanently to urban areas. The trend is that, some are more willing and able to make compromises and live in urban areas while others decide to have lower income and stay in the longhouse. This is of course not a complete free choice that the individual and household makes but to some extent also governed the availability of jobs close to the longhouse.

Household with members engaged in in-situ off-farm work, have to some extent lesser savings compared to household with members working ex-situ. They are more operating out of strategies of consolidation and short-term capital accumulation, than the other group of household who are in a higher degree working to make structural improvements on their livelihood situation. It is here important to stress that especially the households with in-situ off-farm work are usually very flexible and adoptive, so new livelihood strategies are being pursued if unemployment rate is high or if accumulation of cash has been enough to last for a while.

There is thus a general inclination for household to have at least one member occupied in off-farm work but agriculture also play a decisive role in overall livelihood strategies as a supplement to off-farm income, as a ways to minimize risk through diversification of activities and at the same time fit with existing social arrangements in the longhouse.

The farm workers are women with small children or are from the elder generation from 45-50 years and onwards, who either has been farmers all their life or who has come back from other jobs. Only very few able-bodied men are farmers fulltime and thus they constitute a small minority in the longhouse. They valued the independence they got from being farmers very highly.

The land area cultivated and the crops grown are influenced by the fact the household are able to capitalize on the labour of two people. In general, the lack of labour is the key constraint to agricultural production and development in Rumah Muiang.

Logging is also an important feature for some of the households in Rumah Muiang as an income generating activity either through own felling or through leasing. The logging also has more fundamental implications for the future development perspectives for the villagers of Rumah Muiang. An estimated 20% of the total land holdings have been sold either for logging purposes, establishment of oil palm plantations or for future speculation on land as a commodity. It has mainly been households with large landholdings that have sold some fraction of their land as a mean of capital accumulation working from a strategy of structural improvement. In this sense these household constitute a small over class that is engaged in entrepreneurial activities. The capital from these activities or transactions is usually

invested into further education for the young generation or for the purchase of capital goods.

In general Rumah Muyang has experienced a development where off-farm activities are increasingly important for the economies in the household. This has the implication that although the individuals that work off-farm contribute to the household, they constitute a few generations who is not present in the longhouse on a daily basis. Off-farm work is part of diversified overall livelihood strategies by households, where subsistence farming is being pursued together with small-scale cultivation of cash crop to create additional capital to the household. Logging or selling of land has been another activity some households have been involved in. The off-farm work is pursued, in order to make structural improvements for the future and the surplus created are generally invested into education, which is seen as the primary way to long-term improvement of household situations. In this sense most household are not working through strategies with the purpose of short-term survival but working from either strategies of consolidation or on the other hand accumulating capital trying to make structural improvements.

Land use

In Sarawak as well as in many other parts of the tropical world shifting cultivation has been the predominant farming system in centuries. Shifting cultivation is a term that is used to cover multiple different systems that all has been adapted to certain climates, certain topographies, soil types, culture, the choice of crops, etc. (Nye and Greenland, 1960). However, Conklin has made a general definition in 1957, which describes shifting cultivation as “any agricultural system in which the fields are cleared (usually by fire) and cultivated for shorter periods than they are fallow” (Warner, 1991). This system is especially well suited to the tropical soils that are usually very infertile. When a piece of land is cleared and subsequently burned the nutrients in the biomass are released to the soil (Palm et al., 1996). During the cropping phase nutrients are removed with the crops or leached from the soil (Nye and Greenland, 1960; Kleinman et al., 1996). When the field is abandoned due to decreasing yields or an increasing amount of weeds the forest slowly regenerates and nutrients accumulate in the biomass once more. The area can thus be used in a cyclic matter where the farmer returns to the same plot after a certain time.

In Rumah Muyang the practice of shifting cultivation is still prevalent for the production of hill paddy but overall the cultivation of crops and farming systems has diversified and permanent farming of cash crops like pepper has become important.

Field type	Hill paddy	Wet paddy	Pepper	Fruit
Average size	2,8 +/- 2,2 acres.	1,8 +/- 1,5 acres.	2,7 +/- 2,1 acres or 100-500 wines.	3,2 +/- 1,7 acres.
Terrain	Hilly but can be planted on flat land.	Flat areas that are possible to flood.	Hilly.	Flat and slightly hilly areas.
Soil	Friable to compact with signs of burned debris in various sizes from logs to small pieces mixed with the soil.	Wet and muddy, often waterlogged.	Compact, very little organic matter, some with lichens on top, soil trenched around wines.	Some organic matter in the top layer of soil. Litter layer on top.
Use	One season after on average 5-6 years of fallow. However the fallow period also depends on land available and distance to land.	Used permanent or with a one to two year fallow in between cultivation.	Used permanently for around 15 years.	Used permanently.
Vegetation	Hill paddy often interspersed with corn and vegetables, tapioca, cucumber, winter gourd, etc. especially on gentler slopes.	Monoculture.	Often vegetables planted in- between wines, chili, tapioca and papaya.	A mixture of fruit trees, rambutan, banana, grasses, etc. Mainly perennials
Cover	Ground somewhat exposed between tufts. 50% coverage.	Ground exposed between tufts.	Ground very exposed between pepper wines -10% coverage.	Ground covered by litter and canopy.
Signs of erosion	Gullies on very steep fields.	None.	Gullies and topsoil washed away on slopes.	None.
Fertilizer	Application varies from no use to 3 times a season. Fertilizer thrown on.	Application varies from no use to twice a season. Most use once when planting. Fertilizer put in together with stalks or thrown on.	All use fertilizer applied 3-4 times a season. Fertilizer buried app. 15 cm from stem (5 cm down).	Mostly used when fruit trees are young. Fertilizer applied around the stems.
Pesticide	Herbicide applied once before or right after planting or used only if weeds shade rice.	Herbicide applied before planting and sometimes during growing.	Herbicide applied every 1-2 month. Insecticides from twice a week if plants infested to once every other month.	Use varies from none to every other month.

Table 2: Field characteristics

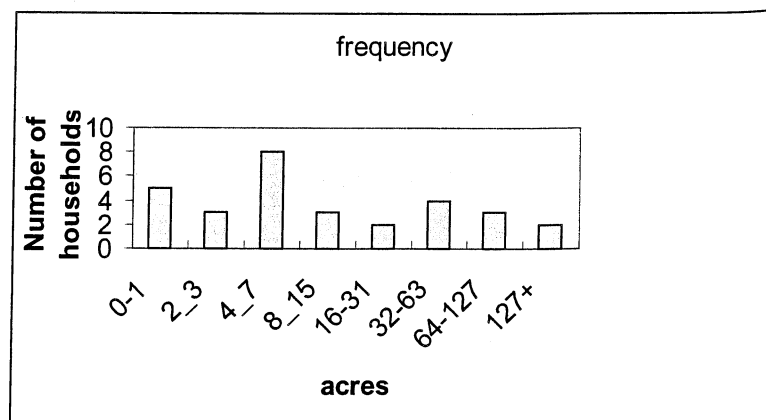
The table comprised by information obtained from field observations, from semi-structured interviews and from the household surveys. It provides an overview of how the land is affected by the cultivation practice and how the cultivation is carried out.

Land distribution

According to the headman of Rumah Muyang the longhouse has around 2000 acres in total. In our own survey we only calculated an area of 1072 acres but the discrepancy can be due to the fact that some of the households only mentioned the land they cultivated and not the land that was fallow and not all households were covered by the survey.

The fields belonging to the villagers of Rumah Muyang are scattered over a large area, where fixed boundaries have not been established by land survey, which caused some disputes with other longhouses about the boundaries. This fragmented picture is partly due to the opening of new land not necessarily adjoining the old land. It is also due to splits of longhouses where on two occasions, a larger section of people decided to start a new longhouse but still maintained their landholdings.

The land is not evenly distributed among the people of the longhouse. The villagers that have founded Rumah Muyang have significantly more land than relatively newcomers to the village.

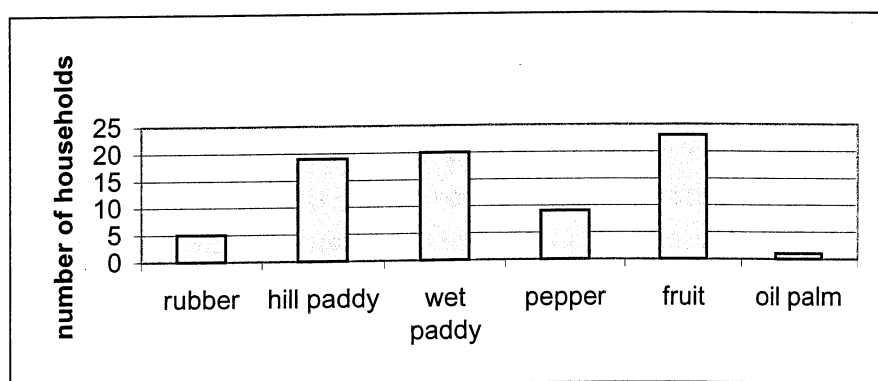


Figur 1: Land distribution

There is no obvious correlation between the land holdings and the land cultivated in the sense that the families with more land were for the most part not more engaged in farming or cultivated larger areas than the villagers with smaller landholdings

Land use and livelihood strategies

In Rumah Muyang the main agricultural activities are shifting cultivation of upland rice (hill paddy) and permanent farming of wet paddy rice, pepper and various fruits and vegetables. The majority of the rice cultivated is only for consumption although an occasional surplus is sold. Vegetables and fruits are used as subsistence crops but also play an important role as cash crops, in household attempts to generate income. This is especially true for fruits like rambutan, banana and durian. The reason for this is that the government since the mid-90 through schemes has provided fertilizer and pesticides for the establishment of fruit gardens and thus creating an incentive to start fruit production. Pepper is the only crop produced that is strictly for sale. It was introduced to the area in the beginning of the 80's and has from government side been promoted heavily through subsidizing of chemical inputs and initial investment. Earlier on there has also been a production of rubber in the Rumah Muyang area but due to declining price this production has ceased although many rubber plantations are still left. Oil palm plantations are very common along roadsides in the Niah District but only one household in Rumah Muyang is directly involved in the cultivation of oil palms. However this might change as more households mentioned they were interested in converting to oil palms. Figure 3 shows the dominant crops in Rumah Muyang on a household basis.



Figur 3: Crops grown by number of households

Besides the crops shown in the figure vegetables are interspersed in the fields.

The distribution of crops can be seen as part of the division of labour and livelihood strategies pursued by people of the longhouse. As the hill and wet paddy is mainly cultivated by women –except for the clearing of land -it is also one of the things that

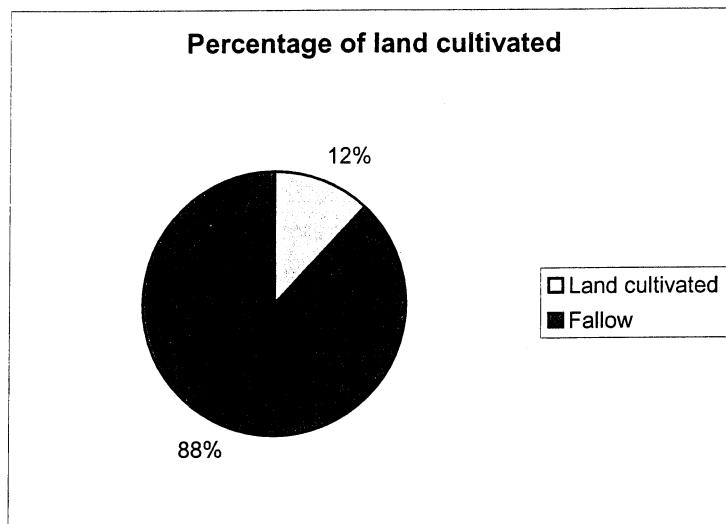
is still pursued by most of the households. Due to the seasonality of the cultivation women can take care of the land while at the same time taking care of household chores including children. The rice cultivation also has cultural value (Mertz et al., 1999) and the cultivation of crops for consumption is valued if the husband has off-farm work. The households that have a stronger inclination towards farming are usually cultivating pepper and have males at least part time involved in farming. The cultivation of pepper is very labour intensive (Department of Agriculture, Sarawak) and this is not easily combined as stated earlier with the other duties of the women.

The number of households involved in pepper farming reflects the relatively few households cultivating cash crops compared to household that generate income from off-farm activities. As fruit orchards mainly has a high labour requirement during planting and harvesting it is possible for women to take care of the fruit orchards and sell the surplus. Often the fruit trees are located around other fields or close to the longhouse and do not demand much maintenance.

In Rumah Muiyang we also found that in recent years there had been an increase in people investing in pepper and fruit trees. The pepper investment is done by the men already involved in farming or by in-situ off-farm workers that are not full time employed in off-farm work. The people planting fruits are mostly families where the husband is working off-farm on a more permanent basis. Both activities can be seen as a way to diversify their income generating activities within the limits of labour and time available.

Agrochemicals are used by most households in farming practices both for subsistence and cash crops production. The use of chemical inputs started in the 70's and most of the people in the longhouse have not increased their use of chemical inputs since and the reasons given for this is the expenditure. The use of pesticides is to no great surprise pragmatic in the sense that pesticides are used if they can afford them and if the pests become a problem. This can also be seen by the fact that the use of pesticides increases when subsidised. Although this is the prevalent view some people informed that due to labour shortages the use of pesticides has gone up.

In 1960, Nye and Greenland mention that the distance from the household or village is an important factor for the length of fallow periods. This point was confirmed in Rumah Muiyang where the proportion of fields fallow is greater for fields further away from the village, a trend that is also visible in the other longhouses we visited. Again this can be seen in the context of livelihood strategies where people are optimising their choices of cultivation. The choice is between less fertile (and more often cultivated land) but easily accessible land or more fertile land further away and is based on a weighting between yield, other income generating activities, social relations etc. The land available, also determines the fallow period.



Figur 4: Ratio between fallow and cultivated land

In Rumah Muyang the land used for cultivation is much smaller than the land that is fallow. One of the reasons for this is the uneven distribution of land as some families mention they would like to increase cultivation if they had more land. Another reason, perhaps the more important one, is the migration of the labour force which causes a dis-intensification as the people get employed in other sectors than the agricultural. In general there seems to be, even with people who has sold land, a strong desire to hold on to land. Possession of land is connected to the culture and land serves as a saving or a resource which can be used by future generations, if unemployed, or when they retire.

In general the agricultural production in Rumah Muyang can be seen as a “no time is left idle”-strategy. People are all the time involved in different activities and agriculture is used in a dynamic way. Cultivation is taking place if there is an opportunity to do so. In other villages we visited, the land is used differently with more focus on logging activities on own land and cultivation of other crops due to other agricultural schemes. However these strategies is also very adaptive to the opportunities available.

Impact on the environment

One of the important parameters for the impact of land use on the environment is erosion. Erosion causes a decrease in soil organic matter by removal of the topsoil and thereby affects the soils ability to hold nutrients, its soil structure and water holding capacity.

In studies it has been found that erosion is, among other things, correlated with slope and with the vegetation coverage. As we did not measure the erosion we have no precise figure for the loss of soil from the fields of Rumah Muiyang but a tendency to greater erosion from steeper slopes was observed. Especially from the pepper fields signs of erosion in terms of gullies and very little organic matter in the soil can be detected. This is no surprise as the pepper is cultivated on slopes and with no cover crops (see table 2). None of the farmers interviewed considered using cover crops apart from some vegetables, as cover crops were thought to "steal" the nutrients from the pepper. Farmers are, however, aware of the problem of erosion and dig down the fertilizer to prevent wash off. The soils on the pepper fields is also very compacted due to the low content of organic matter which reduce infiltration and makes it more vulnerable to surface run-off.

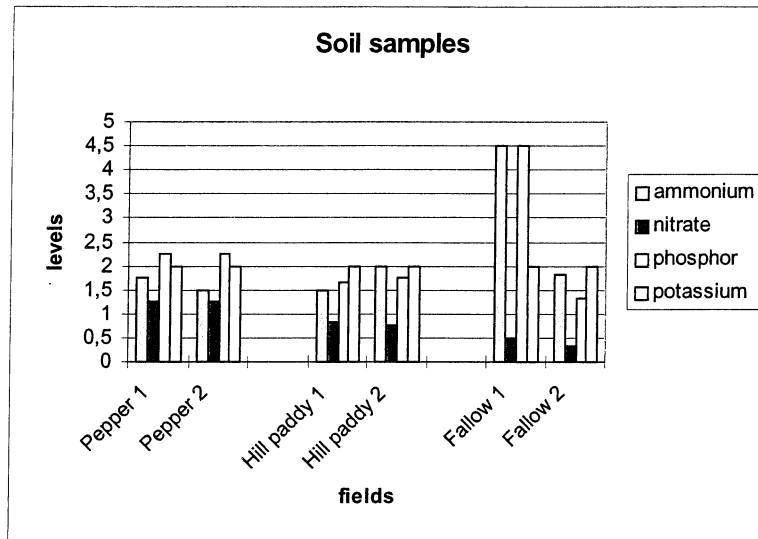
The hill paddy is also prone to erosion due to cultivation on hillsides. However it is only on very steep slopes that erosion is detected. This is related to the fact that plants are planted closer in hill paddy than in pepper fields and the interspersion of rice with corn also creates a "canopy" that decreases thoroughfall and thus erosion. The soil in hill paddy fields contain much more organic matter than soil in pepper fields and is more friable. The pepper fields are used for several years and the organic matter is washed off or mineralized whereas the hill paddy is used one year only before it is abandoned. This means the period, where it has been left with relatively little cover, is much shorter which has a positive effect on soil quality. The people in the longhouse are aware of the correlation between soil quality and fallow length. The diameters of the stems are used as an indicator of soil fertility. The informers did not mention the soil quality aspect if the fallow was short (2-3 years) but then weeds was mentioned as a problem in the following cultivation which is well correlated with more seeds of early succession plants left in the seed bank.

The fruit orchards visited are located in less hilly areas and this contributes to the lack of erosion from these fields. Also the canopy cover serves as a protecting agent.

All the field types and most of the fields receive fertilizer and pesticides. Especially the pepper has very high chemical inputs. If considered how many nutrients are removed by harvest, a big input of fertilizer is not expected. However the nutrients are washed away and the low CEC means that a lot of the nutrients are leached from the soil and it is thus necessary to apply much fertilizer. Pepper is the only crop where insecticides are used which can be due to the fact that pepper is not adapted to the native pests or that the perennial monocultures of pepper causes good conditions for pest outbreaks.

Soil

The soils examined were mainly Ultisols and although there is always a great heterogeneity in soils we tried to look for some general trends in soil quality by conducting quantitative test.



Figur 5: Results of soil sampling

Field	Composite 1	Composite 2
Pepper	4,8	4,7
Hill paddy	5,6	5,5
Fallow (young)	6,2	5,0

Tabel 3: Results of pH measurements

If possible it would have been interesting to take soil samples in a fruit orchard but unfortunately there was none in the vicinity of the valley. Also, it is suspected that the soil under fruit orchards would have some of the same qualities as soil under fallow fields as both have perennials. It would have been interesting to confirm this but under the circumstances it was not possible. Wet paddy was not included in the quantitative study, as the physical and chemical parameters would be substantial different from cultivation done on hillsides.

It is important to keep in mind that the values found are from estimates of colour in a solution, compared to a colour chart and the reliability can be questioned. There seems to be a bit more nitrate and phosphor in the soil from the pepper field, which can be ascribed to the application of fertilizers.

The pH and ammonium and phosphor content of the two fallow composites are very different from each other. As the samples were randomized one should expect them to be alike, therefore differences must be ascribed to soil heterogeneity or an error occurred during the handling and drying of the soil. The hill paddy field has recently been burned, which can explain the higher nutrient contents in hill paddy than fallow. This however, does not correspond very well to the pH because the burning should have lead to a higher pH due to influx of cations. It is important to notice that both the fallow and hill paddy has higher pH than the pepper field, which is to be expected due to the presumably lower CEC of the pepper field.

General impact on the environment

We found that the land uses and farming practices had very different impacts on the environment with some more benign than others. For instance, although hill paddy farming affects the environment negatively with the burning of the forest and some erosion during cultivation, the fallow period also has to be taken into consideration. If the fallow period is long enough for the forest and soil to regenerate then studies have shown that shifting cultivation can be a sustainable way to utilize the land (for example Kleinman et al., 1996; Brady, 1996) and the different succession stages can increase biodiversity. You can argue if this is the case in Rumah Muyang and the answer is probably, that on some fields the fallow periods are long enough to have this effect, whereas other fields are becoming degraded by too short fallow periods. In order to investigate this fully, a more thorough study has to be conducted.

The pepper fields are perceived to have the greatest impact on the environment. The erosion from them is relatively large and take place over such a long period, that recolonization by natural vegetation will take decades. Other environmental costs is that pesticides are released into the environment and run-off of fertilizers can cause eutrophication of nearby rivers and streams.

Compared to the pepper, the other perennials farmed have less effect on the environment. Quite a lot of fertilizers are used in the fruit orchards but mainly when the trees are young which enables them to pick up more nutrients. No signs of erosion from fruit orchards are seen. In terms of biodiversity the fruit orchard also has advantages with many of the different species planted alongside native annuals and perennials. This trend is even more pronounced in old rubber plantations which are hard to distinguish from secondary forest.

Overall, it is very difficult to thoroughly evaluate the impact on the environment of different land uses. There are many parameters to take into consideration some which interact with each other, some which are very hard to measure logistically (eg.

biodiversity), and many that requires long time monitoring. Our perception of the environmental impact from different land uses is thus not conclusive but is only a compilation of the observations made during the fieldwork.

General discussion

According to Rigg (1998) the changes in agriculture are linked to the effect, that non-farm work has on labour availability in households. He sees these effects of labour loss in terms of intensification, dis-intensification, environmental degradation and land abandonment. As the earlier chapters have shown many of Riggs findings can be confirmed in Rumah Muyang.

The households of Rumah Muyang have diversified livelihood strategies with off-farm work as the primary income generating activity. Most of the labour is not invested into agricultural production, which has lead to changes in the land use.

However when evaluating if an intensification or dis-intensification has proceeded in Rumah Muyang it is necessary to be aware of the complexity inherent in the systems. It becomes a matter of evaluating different farming practices, in which the indicators for agricultural intensification are not the same. In permanent farming systems intensification are in general, measured by the use of extra chemical inputs and shortening of crop cycles by the introduction of new high yielding crop variants. In shifting cultivation the fallow length is the prime indicator for intensification. The word dis-intensification can also have several meanings, a decrease in the use of chemical inputs or an abandonment of cultivation on the land.

On the land belonging to the household of Rumah Muyang there is an overall dis-intensification taking place in the sense that more fields are left uncultivated due to labour constraints (see figure 4). For the few households still mainly involved in agriculture, the improved infrastructure has made it possible to sell products mainly produced by permanent farming. This can give reason to think of intensification on a smaller scale. Instead of considering intensification as a two-way process where farmers move along a scale either towards greater intensification or dis-intensification, it can therefore make sense to see it as a process of simultaneously intensification and dis-intensification.

Rigg (1998) mentions that the transformation in agriculture can cause environmental degradation. As we perceive it, the changes in land use can have negative and positive consequences. A situation where more fields are in fallow creates the possibility of greater biodiversity and less strain on a majority of land. On the other hand, the intensification on small pockets of land with permanent crops, that relies heavily on

chemical inputs has environmental costs like erosion, eutrophication of streams, accumulation of pesticides in the soil.

Overall though the development with more areas left with secondary growth, would from an environmental aspect be preferable but it has to be taken into consideration if this scenario will be the case. One can easily imagine a development, if the situation in Sarawak in general is taken into consideration, where uncultivated land is sold or changed to oil palm plantations.

Conclusion

The objective of this paper has been to look at the agriculture and livelihood strategies in Rumah Muiyang at the household level.

Our main findings are that Rumah Muiyang has experienced some of the same general development trends, which has taken place in Sarawak. Our observations are that people have diversified livelihood strategies with off-farm work as the primary income activity. A large group of the men between 16-45 and women between 35-50 are employed in off-farm work. This creates a labour shortage within agricultural production. Insecurity in land rights and environmental uncertainties also play an important role in choice of occupation. In general, the perception held in most households is that even though agriculture is considered important, off-farm work and education is seen to hold the greatest development opportunities. Although many households are depending on off-farm income, cultivation of hill and wet paddy rice is still important for cultural reasons.

We did not find any conclusive results from our soil sampling. However from the qualitative data obtained the impact seemed to be greater from permanent farming of pepper than from other agricultural practices.

The initial hypothesis of an agricultural intensification was taking place could not be verified. Instead our findings showed an overall dis-intensification occurring on the majority of the land. Even though intensification is not prevalent, one cannot exclude the possibility of a minority of fields, being farmed more intensely.

Future perspectives

In this section we will try to say something about the future development trends that we are expecting to happen in Rumah Muiang. It must be emphasized that these remarks are very tentative.

Insecurity in land right has been mentioned as an important factor to seek off-farm employment and not do farming. In general there seems to be a strong wish to hold on to the land if possible for the sake of future generations. The income generated from off-farm work can this sense be seen as a way, of how the household can hold on to their land, thereby avoiding the risk of being alienated from rural areas and becoming "landless peasants". The future prospects regarding land rights seem though somewhat gloomy.

The development history in the region makes it unlikely that the people are able to hold on to the majority of their land, if the oil palm industry is enlarged, something that is highly likely to happen. Oil palm plantations are not far from the fields of Rumah Muiang and in fact some of the land is already cultivated with oil palms. These oil palm plantations are either private or controlled by the Government. As land rights legislation works right now the majority of the land belonging to Rumah Muiang is in reality beyond their control. They have no real choice other than taking the compensations offered to them, if they are at all offered. Although there has been incidents where local villagers in other longhouse has defended their land rights through violent clashes with gangsters working for Chinese middlemen, longhouse communities are divided in the struggle for their land rights. There seems to be no real political unity between Iban longhouses, which are often engaged in land disputes among themselves. So external pressures are working against the land rights of the Ibans, not only in Rumah Muiang.

In line with the above-mentioned problem another interesting future prospect is continuing changes in longhouse community structures. The next generation, which is born and raised in the town, are losing or not learning any farming skills. The question is whether this generation will be able to maintain a strong connection to the longhouse community and come back and live there. Within younger generations there do not seem to be that great interest in farming. So a situation might occur where the older generation struggles in a losing battle to hold on to their land but that future generations are not interested in cultivating it as farmers.

References

- Brady, N. C. (1996). "Alternatives to slash-and-burn: a global imperative". *Agriculture, Ecosystems and Environment*, 58, 3-11.
- Jabu, D.E. (1988). "Historical perspective of the Ibans". *Seminar Budaya Iban*, Ministry of social development of Sarawak 1988.
- Cramb, R. A. and Reece, R. H. W. (1988). "Development in Sarawak: Historical and Contemporary perspectives". *Monash papers on Southeast Asia*; no. 17. Centre of Southeast Asian Studies, Monash University.
- Casley, D.J and Kumar, K. (1988). "The collection, analysis, and use of monitoring and evaluation data". *World Bank*, Washington D.C, pp.10-25, 54-75.
- Department of Agriculture, DoA, Sarawak (2000). "Management for Agricultural Crop Development Schemes". *Seventh Malaysia Plan. 1996-2000*. Crop Branch., Sarawak, Malaysia.
- Doran, J. W. and Safley, M. (1997). "Defining and Assessing Soil Health and Sustainable Productivity". In C. E. Pankhurst, B. M. Doube and V. V. S. R. Gupta (eds). *Biological Indicators of Soil Health*. CAB International, 1-28.
- Kaur, Amarjit (1998). "Economic change in East Malaysia". Macmillan Press Ltd.
- King, V. T. (1993a). "Politik pembangunan: The political ecology of rainforest exploitation and development in Sarawak, East Malaysia". *Global Ecology and Biogeography Letters* 3: 235-244.
- King, V. T. (1993b). "The peoples of Borneo". University of Hull. England.
- Kleinmann, P. J. A., Bryant, R. B. og Pimentel, D. (1996). "Assessing Ecological Sustainability of Slash-and-Burn Agriculture through Soil Fertility Indicators". *Agronomy Journal*, 88, 122-127.
- Kvale, S. (1996). "Interviews, an introduction to qualitative research interviewing". Sage publication inc, California
- Lambers, H., Chapin III, F. S. and Pons, T. L. (1998). "Plant Physiological Ecology". Springer-Verlag. New York

Mertz, O., A. E. Christensen, P. Højskov and T. Birch-Thomsen (1999). "Subsistence or cash: Strategies for change in shifting cultivation. *Danish Journal of Geography, Special Issue 1*: 133-142.

Nye, P. H. and Greenland, D. J. (1960). "The soil under shifting cultivation". *Technical Communication No. 51*. Commonwealth Bureau of Soils Harpenden. Commonwealth Agricultural Bureau. Farnham Royal. England

Palm, C. A., Swift, M. J. and Woome, P. L. (1996). "Soil biological dynamics in slash-and-burn agriculture. *Agriculture, Ecosystems and Environment*, 58, 61-74.

Rigg, Jonathan (1998). "Rural-Urban interactions, agriculture and wealth: A Southeast Asian perspective". *Progress in Human Geography*, 22, 4, 497-522.

Rigg, Jonathan (1997). "Southeast Asia – The human landscape of modernization and development". Routledge. London.

Szirmai, Adam (1996). "Economic and Social Development". Prentice Hall.

Warner, K. (1991). Shifting cultivators. Local technical knowledge and natural resource management in the humid tropics. *Community Forestry Note 8*. FAO. Rome, Italy.

Appendix 1

Household survey guide.

1. What is your name? And age?
2. Who lives in your household? Do they come home every night?
3. What is their occupation?
4. If off-farm job – What is the wage?
5. What is their education?
6. How much land do you owe?
7. What do you grow?
8. Do you use fertilizer and/or pesticides? – How much and how often?
9. How far from the longhouse are your fields?
10. What other sources of income do you have?
11. For how many years have you lived it the longhouse?
12. What assets do you have?

Question 1, 3,4, and 5 were asked for all household members.

Appendix 2

Semi-structured interview guide

Development.

1. Why do you prefer to be employed rather than do agriculture on your land?
Why don't you work off-farm? (if only farming) Have you tried to get off-farm work?
2. When did you start off-farm work? Have you had different jobs?
3. Would you like to live in the town/city?
4. a) What do you think on how to improve agriculture sector in the area?
b) What do you think of the role played by the Department of Agriculture?
5. What are the types of development that has been brought by the government to this area?
What do you think of the subsidies?
6. What type of development do you expect from the government?
7. Do you think they do enough?
8. What would you like your children to do?
9. What do you plan to do with your land?
10. Have you ever requested farm/land based program for your land?
11. When did the "off-farm development" start (to headman).
12. Do you think that women should not work off-farm?
13. What kind of development do you think have happened to this longhouse?
14. What kind of development would you like to be done on your land?

Education

1. What do you think is the importance of education?
2. How many of the people in this longhouse are considered successful educationally?
3. What is their academic performance?
4. Your children have attended school, what level of education do you expect them to achieve?
5. What do you think has to be done to improve the education level and standards of the future generation?
6. What is the best for government to do in order for your children to achieve high education?
7. What have you done or contribute to improve the education level of your children?
8. Where does your children go to school?
9. Is their education subsidized or how do you support their education?

Health

1. Where do you usually go for medical aid? Government or private?
2. How frequent do you or your family go to clinic?
3. How fast is the medical department's service in your area?
4. What do you think should be done to further improve the standard of their service?

Land rights

1. What do you know about your rights to your land pertaining to NCR and NCL?
2. What do you think of the law? How do you think that the Adat works?
3. How should the law or administration be improved?
4. Do you request the government to do the land survey on your land?

Income and expenditures

1. Do you depend solely on your farm produce for food?
2. How often do you buy vegetables, chicken or fish?
3. How much do you spend on food per month? Does it vary?
4. How much do you use on housing and food per month? (If the off-farm worker is only home a few days or few weekends per month)
5. Do you have savings? What kind?
6. Are you affected greatly by droughts or floods?