

Livelihood Strategies in Lemanak

**- Focus on Economic and environmental
Sustainability**

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1. Abstract

During a two week field course on methodologies in Lemanak, Sarawak, varieties of the PRA and RRA methodologies were used to obtain information on the livelihood strategies of two longhouses. The RA methodology proved useful in providing data on a limited time scale. Methods as semi-structured open-ended interviews, participatory observation and ranking were used and are discussed in this paper. The livelihood strategies consists of land use activities and wage labour ensuring a spread of risks. The land use encompasses subsistence production of rice as well as production of cash crops as oil palm, pepper and rubber. The erosion risk of the land use activities were found low, making a sustainable output possible.

2. Introduction

As described in the team introduction the main concern of this group is the sustainability of the livelihood strategies pursued by the longhouse. The focus of the fieldwork is presented in an overall objective, which is treated in detail in five specific objectives.

2.1 Background

The objectives listed beneath are constructed to attain a knowledge about the way in which the longhouse dwellers construct their livelihood strategy. Dealing with smallholders who produce a substantial part of their own consumption, the peasant theory of Chayanov (Turner & Brush, 1987; Johnston et al. 1994) provides a theoretical framework for considering the rationale of smallholder behaviour in the transition towards greater dependency on the market. This also implies an analysis of the risk management; how the peasant family allocates its time and resources to different activities according to the expected outcome of these. This can be rather complicated regarding e.g. palm oil, as the outcome from palm oil production is dependent on a variety of factors such as the biophysical conditions, the availability of government subsidies, the world market price on palm oil and the foreign exchange rate as the world market price is in US\$ (Gillies et al., 1996; Streeten, 1987). Specific objectives one to three deal with the composition of the household economy and specific objective three deals in particular with the time use allocated to different activities. An analysis of the time consumption of rice production is done by Freeman (1955) and these data from Freeman are presented in a spatio-temporal framework by Carlstein (1980) indicating that

transportation time from longhouse to the field may comprise a substantial part of the hours available for work during a day. When addressing the economic sustainability of the longhouse we wanted to assess if the income, monetary and subsistence, could improve or at least be stagnant in an infinite number of years¹ (the sustainability concept is based on World Commission on Environment and Development (1987)).

Considering the sustainability of the income generated from land use activities, the land resource must also be taken into account. As the fertility of the soil, and thereby the ability of the soil to produce an outcome, is partly dependent on the soil organic matter which is located in the topsoil, soil erosion is a major yield inhibiting factor (Greenland, 1994; Woomeer et al. (1994)). It is therefore important to prevent soil erosion in order to ensure sustainable yields.

Taking departure in the economic and environmental issues relating to different land use activities, we would like to correlate the two spheres and make a synthesis on our findings.

¹ This relates to the real-wages, an issue not dealt with here.

3. Methodology and Methods

In this chapter the methodology chosen for the field study and the different methods used are outlined. This is done to get an overview of the issues taken into consideration when constructing the project and choosing the methodology. Moreover, it is done to give a background for the evaluation of the methods used, presented later in this report.

3.1 Methodology

Before leaving Denmark, we constructed the first draft of our project. This was based upon identification of key issues, upon which work hypotheses could be build. As little information about Lemanak in specific was available, the hypotheses were based more upon assumptions than upon knowledge.

Literature studies including Iban communities, different systems of natural resource management and government land policies in Sarawak were carried out in Denmark. Here it became evident that a methodology which deals with the way in which different actors of a system, e.g. a complex and divers farming system or a system of livelihood strategies, would be the most suitable. Further, the target group of our survey was the local Iban communities. We would therefore need a methodology that takes the validity of the points of view and knowledge of these people into consideration. Moreover, as very little was known before arriving the study site, there should be possibilities for changes, adjustments and additions within the framework of the methodology.

The Rapid Appraisal (RA) methodology was found to fit the above mentioned requirements. In the context of the RA methodology the Rapid Rural Appraisal (RRA) and Participatory Rural Appraisal (PRA) methods have been developed (Chambers, 1992; Chambers, 1994a; Chambers, 1994b; Messerschmidt, 1995; Mikkelsen, 1995).

The distinction between the RRA and the PRA methods are not always ambiguous. Chambers (1992) describes RRA as a method by which information is taken away from the site and analysed by the investigator. PRA is described as a method where information is shared and analysed at the survey site.

Our survey lies somewhat in between these two definitions as some of the information were shared with the local informants through participatory mapping, visual ranking and informal discussions;

but due to our limited time frame the actual data analysis took place in Kuching and in Denmark, far away from the survey site.

In addition to the method which could provide us mainly with qualitative data concerning land use activities, use of chemical agents, different ways of income, subsistence activities and time allocation we applied measurement of different soil erosion parameters. The erosion risk of different land use activities can be estimated by measuring steepness of the fields, the extend to which the soil is covered by organic matter and what kind of crops are cultivated (Landon, 1991). These measurements were included in the survey to make a quantitative supplement to the qualitative data obtained through the RA methods.

3.2 Selection of Survey Site

Selection of Lemanak as survey site was not carried out by this group. The surveyed longhouses were selected on the basis of the one criteria, that they had to reflect the involvement in the oil palm scheme. We therefore choose one longhouse which took part in the oil palm scheme and one that did not. Moreover we choose only to include two longhouses in our survey, as we would like to spend more time getting deeper into things at one or two places.

3.3 Methods

To fulfil the objectives mentioned in the introductory chapter, the PRA/RRA tools used in this survey were the ones mentioned below. A discussion of in what way the objectives were fulfilled and the usefulness of the methods will be dealt with in chapter 6.

Methods applied:

- Semi-structured, open-ended interviews, group and individual interviews
- Direct and participatory observations
- Pair-wise rankings
- Participatory mapping
- Field measurements (erosion risk parameters)

3.3.1 Semi-structured, open-ended interviews

The interviews were carried out using a semi-structured open-ended questionnaire (appendix I), which leaves room for adjusting the questions tentatively (Casley and Kumar, 1995; Messerschmidt, 1995; Mikkelsen, 1995)

This was conducted as a baseline study questionnaire, from which further questions and interview guides were to be conducted iteratively. The interviews were carried out both with single farmers, with groups of representatives for different long house committees and with groups of women.

3.3.2 Direct and participatory observations

In order to cross check the information given during the interviews, to get the opportunity to visually verify and to go deeper into the things, occasions, structures observed direct and participatory observations were carried out. These give an opportunity to discuss relevant topics, it is sometimes easier to relate discussions to things actually seen than to things mentioned during an interview e.g. inside a house (Ibid.).

The observations were done both as arranged excursions with two or three informants to the different fields, and in a more informal way, by staying in the longhouse, walking in the surrounding gardens and fields while talking to people, taking part in different social events, etc.

3.3.3 Ranking

The ranking is a way of illustrating priorities and relating the objects in question to each other. This can be done by using paper and coloured pens, matches, seeds, stones etc. The scope is to let the informants relate visually to priorities within different subjects (Messerschmidt, 1995; Mikkelsen, 1995).

The rankings were carried out during some of the single person interviews, where the informant was asked to rank the economic importance of his/her different activities, and the time allocation on different activities. Ranking of time allocation on different activities was additionally carried out with a group of women, assuming that the work patterns of women were different from men (appendix II).

3.3.4 Participatory mapping.

Participatory mapping is, like ranking, a way of presenting information visually, in this way participation of all informants is facilitated, and the information is shared among the ones taking part (Ibid.).

During the mapping, the participants were asked to help us draw a map of the longhouse, containing information on the number of people in each household, their gender and their occupation appendix III). It was carried out with a number of different informants, as conducting the map using only one informant would give a biased information, it would in addition be tiring.

3.4 Soil erosion

To assess the erosive consequences of different land use activities we adopted three factors from the Universal Soil Loss Equation (Landon 1991, Morgan 1995). The factors adopted are the slope steepness (S), The crop management factor (C) and the erosion control practice (P). These factors were chosen as we found them accessible *in situ*.

The slope factor S will be measured using a clinometer and thereby provide quantitative information.

The crop management factor C is defined as “the ratio of soil loss from land cropped under specific conditions to the corresponding loss from bare tilled fallows. It reflects the protective influence of the vegetation and ground cover” (Landon 1991). The C factor is usually divided into five periods: (i) Rough fallow, (ii) seedling, (iii) establishment of crop, (iv) growing and maturing and (v) residue or stubble. The different stages can be distinguished by the crop cover percentage. Since we only are able to assess the C factor for about 10 days, we decided to use average annual values given by Morgan (1995). The C factor ranges from zero to one, one being bare soil.

The P factor regards the tillage practices. Since the rice fields are tillaged using a digging stick, a comparison of the P factor in quantitative terms will not be possible. Thus, the P factor will be estimated on visual impressions.

To compliment these factors we add our observations on ground cover (of dead biomass).

3.5 Summary

The first draft of the project, conducted in Denmark, was based on few facts and many assumptions, it was therefore important that the methodology used left room for tentative changes and adjustments. Further, it should apply a bottom-up approach using indigenous knowledge as key

source. The RA methodology fulfils this criteria and the PRA and RRA methods lies within this methodology. The method used in the survey lies somewhat in-between RRA and PRA, as some information were taken away form the survey site, others were shared by the informants. As supplement to the qualitative methods used, quantitative data (measurements) were used to estimate the soil erosion risk of different land use activities.

4. Results

The following is a presentation of the results obtained at Merindun and Sebangki longhouses. They are as far as possible systematised to give an impression of the results regarding the overall objective of the study. The purpose is to put the theoretical framework into a practical perspective.

4.1 Activities

To structure the findings we will present them according to two spheres of activity:

4.2 Farm activities

4.3 production of cash crops

4.3.1 oil palm

4.3.2 pepper

4.3.3 rubber

4.4 production / gathering of subsistence crops

4.5 Paid labour

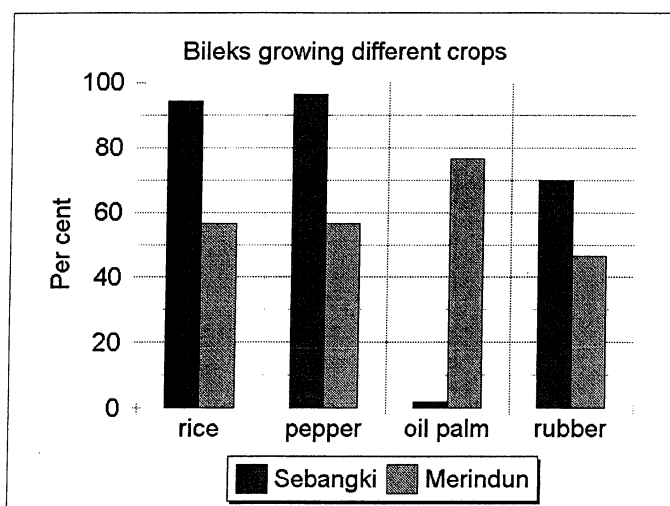
As the specific objectives are partly overlapping, the results concerning the objectives are systematised under the headings of farm activities and paid labour - the data concerning objective five will be limited to 1c).

Other contributions to the household economy than mentioned above exists - hunting and fishing etc. - this is, however, a minor contribution and we will not discuss this kind of off-farm activities further.

4.2 Farm activities

Figure one shows the percentage of bileks² in the two longhouses which grow the main cash crops and the main subsistence crop, rice:

Figure 1 Percentage of bileks growing rice, pepper, oil palm and rubber



It is seen that pepper, rice and rubber are cultivated the most in Sebangki while oil palm are almost unique for Merindun.

4.3 Production of cash-crops

4.3.1 Oil palms

In Merindun 76% of the households are involved in the SALCRA oil palm scheme as shareholders, staff or labourers. In Sebangki two persons are working with oil palms as non-participants of the scheme.

Cultivation: The palms will be ready for harvest about five years after planting and will be too tall to harvest after 25 years, hereafter the palms are felled. The fruits are reddish, 4 to 5 centimetres

² The bilek encompasses the people living in the household as well as family members living outside the apartment but contributing to the household economy

long and growing in bunches. These are situated at the top of the trunk between the leaves. The fruits are cut down with saw-blades on long poles.

Time allocation: Throughout the life-cycle of the oil palms, the establishment phase of the field is the most work-demanding. This phase can include construction of terraces to facilitate transportation in the area and prevent long-term erosive processes. As the palms mature, harvesting is the most time-consuming part of the cultivation. This is done throughout the year, optimally every fourteenth day, to make sure the fruits are cut in the right stadium of ripening. Harvesting is physically demanding manual labour and is often carried out by hired harvesters.

Use of chemical agents: In the establishment phase herbicide is applied around the young palms to inhibit the growth of competitive plants, but as the palms mature the dense canopy shades out the undergrowth.

Fertilisers are provided by SALCRA and used throughout productive period of the palm, but only to a limited extent, two to three times per year, not following a regular schedule.

Yield and income: The shareholders each own four hectares with oil palm in the plantation. The raw oil fruits are sold to the Lemanak Oil Palm Mill, where it is processed into palm oil. The shareholders receive payment from the sale of fruits and dividends from the sale of oil.

The dividend for a plot of four hectares ranges from RM 3800 to 8000 per year depending on the harvesting intensity. This is paid every fourteenth day and is a substantial part of their total income for the shareholders. The income from the fruits is RM 25 per ton, which is often the pay for the hired harvesters.

In Merindun almost all males - also non-shareholders - are to some degree working with oil palms. This could be as full time wage labourers on the mill, working in their own palm plot or working in the plots belonging to other people in the longhouse. The work can also be organised within one household as a co-operative process between father and son(s).

To sum up, there is no clear division between the farm activities and the paid labour when it comes to oil palms. Both employers and labourers exist within the longhouse and different cases in-between. Forty percent of the men in Merindun are occupied with paid labour *not* related to SALCRA, in one way or the other.

4.3.2 Pepper

Cultivation: Pepper is the most labour-intensive crop, as it needs pruning, weeding and soil preparation as well as input of fertiliser and chemical agents. Pepper is a vine and it is planted to grow up around a pole it is a bush-like, 3 to 3,5 meter tall plant which is about one meter wide. The plants have a life-cycle of twenty years and the fruits can be harvested in nine month cycles after the third year.

Time allocation: Pepper is very demanding in terms of labour input all year round, they are therefore often planted close to the house to minimise transportation time. Pepper has to be pruned and shaped at least every third month. Also a large amount of labour input is needed for keeping the ground bare. This is done both manually and chemically, with the purpose of improving the growth of the plants by reducing competition and to reduce the risk of pests and fungi.

The cultivation of pepper is "private" in the way that the man-power comes from inside the household.

Use of chemical agents: Growing pepper requires a considerable economic for chemical agents. The use varies with the actual prices for the crops and the economical ability of the farmer to pay for the inputs. These inputs are subsidised by the government, who wants to support the transformation from subsistence farming, based on shifting cultivation, to permanent agriculture with a greater degree of market orientation. Pepper, in addition, needs an input of fertiliser which is applied close to the plants approximately once per month.

The plants are very susceptible to fungi and insects and thus have to be sprayed on a regular basis.

Yield and income: Pepper is of substantial economic importance and is grown by almost every household, see figure 1. The number of plants per bilek ranges from 100 to 300. One plant will give approximately 1 to 1,5 kg per harvest. Both yield and prices are variable - the prices have been between RM 3 and 22 per kilo in recent years according to an informant. This amounts to an average of RM 1,000 to 10,000 for the average household.

Figure 2 Fluctuations in pepper prices (source: UN, 1995)

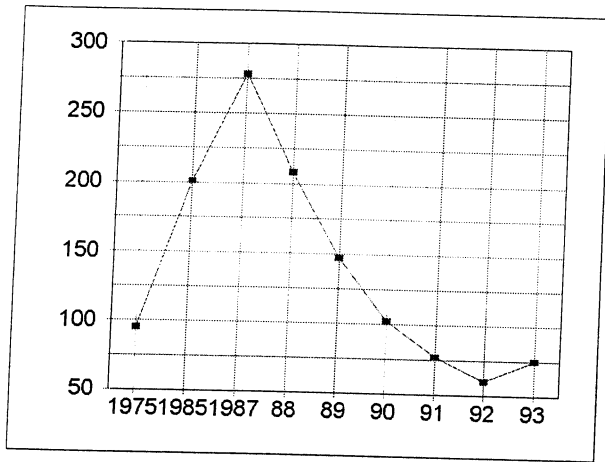


figure 2 shows the fluctuations in pepper prices in relation to an export price index. The price has fluctuated with a factor of four from 1987 to 1992. Recent data indicates that prices have increased in the past years (data from a Sarawakian newspaper).

4.3.3 Rubber

Rubber is a crop of which almost every household at Merindun and Sebangki has a plot. The general picture however, that the world market prices of rubber are so low that it is not worth the effort to tap the trees.

4.4 Subsistence crops

This group of crops is extremely diverse so it will be divided into subgroups to get an overview. Very little is sold from this group, but to make it more comparable with the cash crop-sphere, it can still be regarded as income. this is done from the reasoning that, what they grow themselves it is not necessary to buy, and it does not require a stable cash flow.

4.4.1 Rice

Cultural importance: Rice is in a sphere of its own as it is connected with the spiritual life. It is not looked upon only as a commodity, as it, by some of the longhouse dwellers, is regarded as insulting to the "spirits" to trade, in case of surplus it is saved for later years or given away. Rice is a staple food which is served every day and most bileks grow enough to provide for their annual consumption. The aim for the bileks is to be self-sufficient, as they do not find the taste and the smell of the rice from the market satisfactory.

There are numerous rites connected to the cultivation of rice, and whereas the previously mentioned crops are more or less "individual business", the planting of rice is done co-operatively between the bileks. When the rice is sown, ten to fifteen people will be co-operating on this task. In the fields "The Mother of Rice", an ornamental plant which secures a good growth, as well as alters with offerings for the spirits, can be seen.

Cultivation: The rice is mostly hill rice cultivated as shifting cultivation. This growth practice reduces the need for weeding as the weeds will be shaded out by the forest during the re-growth period and the burning of the trees releases nutrients.

In each field 3 to 4 varieties of rice are cultivated - indigenous species with different qualities: some fragrant and pleasant to eat, other glutinous species for baking and brewing rice wine. The species can be sown in smaller plots within the field or grown in "lampur", which means that the different varieties are mixed in the field.

Time allocation: The amount of time used varies with the seasons with the largest amount of work in clearing the fields, but also in the periods of sowing and harvesting. Weeding is done throughout the growth season.

Use of chemical agents: The use of fertiliser has increased the cultivated periods of the rice field from one to two years to four to five years. This saves work for clearing the plots, but increases the need for weeding which is mostly done chemically.

Yield: The average bilek will cultivate 3 to 5 acres which will yield around 1200 kg with a fertiliser application of 100-150 kg.

4.4.2 Other crops

The men, which we mostly used as informants, did not perceive the subsistence crops very important. During a group interview with females, the most important vegetables cultivated were listed: Cassava, cucumber, chillies, spring onions, lemon grass, sugarcane, maize, cabbage, carrot and pumpkin. These are, from what we have seen, mostly intercropped in the rice and pepper fields, or sometimes cultivated close to the house. This means that transportation time is minimised. Also a diverse range of fruits are utilised.

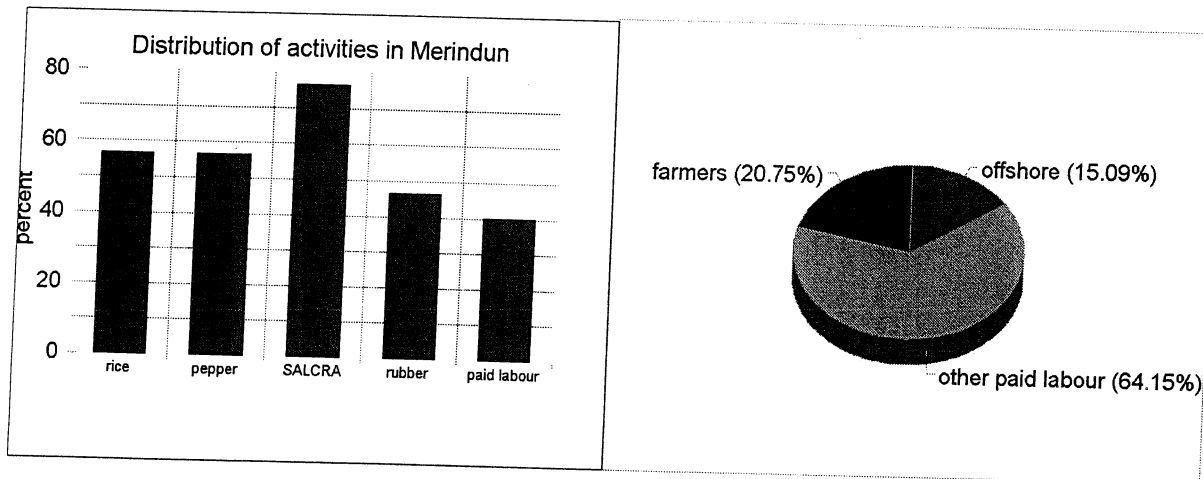
It is hard to distinguish between cultivation and gathering, as the fields are moved and both wild and more or less cultivated products from the fallow fields are used.

4.5 Paid labour

Within this issue the two longhouses show quite different patterns, as Sebangki is not part of the plantation scheme. The cash-income generating activities are important in both longhouses and especially for the men quite time consuming.

In relation to the data on income we will mention that the average household expenses are between RM 150 to 400 per month per bilek. As the longhouses has been paid as they were built (and most people in Merindun have re-paid the loans to SALCRA from the upstart of the plantation) this covers daily living expenses as food supplements, electricity, clothes etc.

Figure 3a & 3b The distribution of labour on bileks for Merindun (left) and Sebangki (right) (source: fieldstudy)



Note: In figure 3b, the groups 'offshore' and 'other paid labour' may also be farmers as the accounting is done on bilek level and encompasses all family members. Figure 3a shows the percentage of bileks involved in different activities. As each bilek does several activities the cumulated percentage is above 100.

Figure 3a and 3b shows the percentage of bileks doing activities related to land use and paid labour. In Merindun 40 percent of the bileks is doing paid labour outside the oil palm estate, whereas the

percentage doing paid labour in Sebangki is 80, of which 15 is in the offshore sector. In Sebangki only one fifth of the bileks are solely farmers, whereas in Merindun more than three fourths are engaged in land use via SALCRA.

4.5.1 Merindun

The general picture is, that the work related to oil palms is the major part of the income, and that the people who do wage labour also put a substantial amount of work into subsistence activities. With few exceptions, women do farming and housework, while the cash-income generating activities are done by men.

Twenty-two percent of the men are farmers which means that they solely allocate their time between oil palm, pepper and rice depending on season and, for pepper (and rubber), on market prices. Five of these are directly hired in the plantation, three as harvesters and two as grass-cutters. Five persons are working at or in relation to the mill.

Eight men and two women who are connected to the longhouse are doing migration work at different locations.

4.5.2 Sebangki

The work-pattern for the men is very complex. Even for those who holds a regular job, doing different farming activities is normal. For those who are full-time farmers the time allocated to different crops vary from day to day, with the changing of the seasons and from year to year with the prices of the cash crops.

Generally more young people are doing migration labour, much of the income in the bileks is derived by younger people sending home money. The average income from a job is RM 5 to 10,000 per year. Six people in Sebangki are doing off-shore work in the oil-sector which can provide a monthly income of 10000 RM for 6 to 9 months per year.

An issue that complicates things is that the composition of households is quite different from the Danish nuclear family. Often three generations is living in the same household and there is an extended sharing of both work tasks and income.

4.6 Erosion results

The erosion risk of the land use activities was assessed for thirteen fields consisting of two oil palm plots, six hill rice fields, one wet rice field and four pepper fields. To complement the data, information were added concerning the ground cover. The observations are presented in appendix IV.

4.6.1 Rice

Hill rice is cultivated on slopes which in our samples are ranging from three to thirty degrees with a mean value of 25 degrees (figure 4). As hill rice comprises a vast majority of the rice varieties grown in the area, and we only have a single observation on wet rice, the latter crop will not be dealt with further on.

Due to the nature of shifting cultivation swiddens are covered with branches, stems, and dead biomass, due to the use of herbicides, serving as erosion preventive mulch. This suggests that the C factor on 0.15 given by Morgan (1995) should be adjusted to take the ground cover into account, but since the rice cultivation observed is rather extensive with large spacing between the individual plants, the figure of 0.15 is maintained.

Regarding the erosion control factor P which relates to the tillage practices, the comment 'no tillage' has been applied in the table, as rice is seeded or planted using a digging stick, a practice which hardly affects the soil and leaves the topsoil undisturbed.

Our impression is that the rice fields are not prone to severe erosion due to human interference³.

4.6.2 Pepper

Pepper is grown on steep slopes as rice. The pepper fields in our sample are a little less sloping than the rice fields. The slopes range from zero to nineteen degrees with a mean value of twelve.

The ground is clean weeded except for one observed field which was covered with mosses. This leaves the soil unprotected, and as the pepper is planted in rows, this suggests a high potential for erosion. However, this does not seem to be the case, and we observed two possible reasons regarding the C and P factors:

- 1) When the pepper is planted a circular hole is made with a diameter of approximately 75 centimetres and a depth of approximately 30 centimetres. This implies that a part of the c- or

³ A landslide was observed in Ulu Telaus by Larsen & Pedersen.

b2 horizon (red clay)⁴ is removed, and the fertile topsoil is filled into the hole crushing the soil aggregates. The sapling is placed in the soft soil, and the c- or b2 horizon is placed on top of the hole to create a *mound*. Finally the sapling is shaded by constructing a 'hut' of palm leaves. This practice involves two erosion preventive means:

- The shading provides a ground cover, reducing the erosive impact of the rainfall (the splash-effect).
- The construction of mounds level the slope around each plant to provide an almost horizontal terrace. This reduces the gravity enforced erosion

2) The iron content of the soil creates a crust concreting the soil.

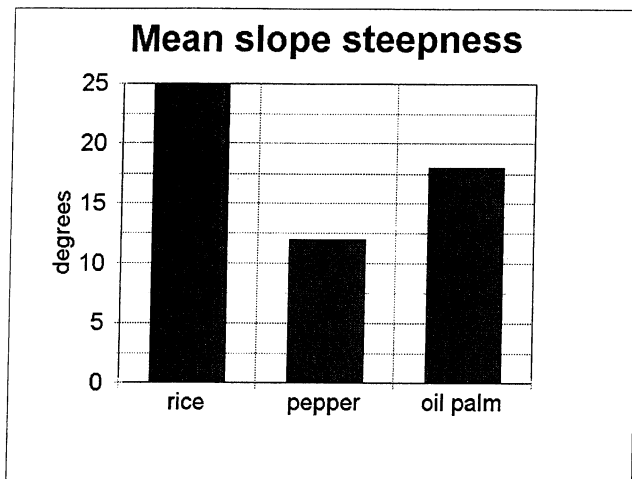
4.6.3 Oil palm

The oil palms observed are situated on slopes ranging from 14 to 21 degrees with a mean value of 18. As the Lemanak oil palm estate is 20 years old the canopy is fully developed protecting the ground from the erosive impact of rainfall⁵. Furthermore there is a undergrowth of ferns, herbs and grasses and the cut-off from pruning is left, so the cover is in two levels. This implies a total ground coverage, suggesting a change in the mean value of the C factor offered by Morgan to a lower value. The erosion preventive practice is the construction of terraces. As this was done twenty years ago any conclusions regarding the effect of this is uncertain. The establishment of terraces creates severe erosion *per se*, but this should be counterbalanced with the erosion prevented. As for the visual observations done, no erosion was visible.

⁴ The soil type may be an ultisol (as suggested by Brookfield et al (1995)) or an oxisol found throughout the tropics (Renton, 1994; Bradshaw, 1993). These suggestion are not based on a soil profile, just on the hole dug by the farmer.

⁵ As the raindrops intercepted on the leaves aggregates, the kinetic energy when they reach the soil may be larger per drop than 'undisturbed' rain (Morgan 1995)

Figure 4 Mean slope steepness on observed fields



4.7 Summary

The two longhouses differ in that the main income for the bileks in Merindun is from the oil palms in the SALCRA plantation. In Sebangki the most of the bileks generate their main cash income from paid labour.

The main cash crops cultivated by the two longhouses are pepper and rubber, though the latter is not tapped at present due to low market prices. The most important subsistence crop is rice which is supplemented by different vegetables inter-cropped in the field and collected in the fallow. The time allocated for the different activities depends on the output from the activity. The same was observed for the input of chemical agents as these mainly are applied when it proves profitable.

The potential erosion risk of pepper cultivation could be considerable due to the clean weeding taking place. This, however, was not observed in the fields. In general, soil erosion did not seem to be a problem in the fields observed..

5. Discussion of results

In this chapter the results from the previous are discussed in a livelihood sustainability context. This is done to relate the results actually obtained to the theoretical framework outlined in the introductory chapter.

5.1 Livelihood strategies

To assess the economic sustainability we constructed objective one to four. The findings related to these objectives reveal that the sources of income for the longhouse as well as the bilek is rather diverse and that the resource allocation to the different activities is based on economic assumptions as well as traditional practices. On the trajectory from subsistence farmer to cash crop farmer the Ibans in the two longhouses are now on a stage involving a reliance on the rice and wild plants for self consumption and a need for pepper and oil palm for cash income. To supplement the cash income from land use activities, wage labour is done.

5.1.1 Resource allocation

The spread of income sources ensures a steady livelihood as the subsistence crops guaranties a safety - in a situation with low market prices and no jobs to get, the basic food will always be available. In the adverse situation, high market prices on cash crops and plenty of wage labour, the resources⁶ will be allocated towards the market. This flexibility of the farming system allows an adaptation to the prevailing conditions. Furthermore, as the pepper, oil palm and rubber are perennials, they can be left for a period, and harvested again when the prices are favourable. But the perennial nature of these crops also implies that the area planted is occupied for a number of years, making the land use pattern rigid.

This rigidity is visible in Merindun as a majority of their land and labour is allocated to the oil palm estate involving a heavy reliance on SALCRA as a source of income, from land use activities as well as wage labour in the mill or as staff. This makes the Merinduns prone to crisis in case of climatic unfavourable conditions as their wage labour is also dependent on land use activities. But for the time being SALCRA provides a substantial income to the Merinduns. Sebangki is not participating in the scheme making their involvement in wage labour is pervasive. This ensures a

⁶ Resources are labour, land and capital (Berry 1989)

spread of wage income, contributing to the resistance of the livelihood strategy, but contrary to this their cash income from farm activities is limited to pepper.

5.2 The sustainability of the livelihood strategies

As discussed above the livelihood strategies of the longhouses consists of a variety of incomes, subsistence activities and indigenous traditions. This ensures a spread of risks, enabling the bilek to generate an income in spite of unfavourable market conditions or crop failure. Considering the sustainability of the livelihood strategies, it is not sufficient only to discuss the present situation. The possibilities for sustaining the strategies in the future must also be taken into consideration. This regards land use in specific as it is dependent on the natural capital stock, which should be preserved or improved in order to term the livelihood strategies sustainable. Therefore we assessed the erosion risk of the fields⁷.

The measurements carried out indicated a erosion risk when focusing on the pepper fields, but no erosion could be detected visually. This may be because of the formation of a crust hardening the surface. Another explanation could be that the soil erosion taking place is not due to the 'splash' effect, but rather a sheet erosion which may not be as visually detectable (Stocking, 1996)

In the rice fields and the oil palm plots the most important erosion preventing practice is the ground cover. This indicates a coherence between the labour extensiveness of the farming and the erosion risk: removing the biomass from the fields would require a high labour input and result in increased erosion risk (and possibly loss of nutrients). The land use practices may therefore be considered optimal from a resource allocation view as well as an erosion prevention view. To offset the erosion on the pepper fields which were most often clean weeded, the fields with the lowest gradients were chosen, suggesting a coherence between the economic outcome of a crop and the gradient of the field.

The ability to sustain an output for the years to come therefore seems good, making the reliance on land use activities and market relations in combination a sustainable strategy.

⁷ As the nutrients of the soil most often is located in the top soil (as is organic matter) (Woomer et al. 1994)), the erosion of nutrients and soil organic matter can be considered as depletion of the soil.

5.3 Summary

The two longhouses are in a transition from rural subsistence farmers to becoming cash crop producers depending on market economy. The overall characteristics of the livelihood strategies chosen by the two longhouses is spreading of risk by putting effort into different sources of cash income as well as into subsistence land use which provides security should the prices on the cash crops drop severely. The different strategies chosen by the two longhouses all have different advantages and disadvantages. The household economies of the longhouses are mostly dependent on cultivation of farmland for both subsistence and cash crops, their situation can therefore only be economic sustainable on a long term basis when the cultivation methods are sustainable. If the soil fertility is declining due to erosion and exhaustion, the present economic development, based on agriculture, might collapse.

6. Discussion of Methodology and Methods

In this chapter the methodology and the methods used are evaluated, related to the objectives and discussed. This is done to put the results obtained into a methodological perspective and to be able to identify where changes could be made.

6.1 The Choice of Methodology

The choice of the RA methodology proved to be a useful approach for the study. A lot of information was obtained within the limited time frame and changes and adjustments, in relation to the first draft of the project, could be made along the way.

One of the things the methodology could not account for was the way we had imagined things before leaving Denmark. We assumed that a systematic approach to the issues dealt with, would ensure a valid and thorough study.

6.1.1 The Choice of Methods in Relation to Objectives

An important method throughout the study were the semi-structured interviews, it was mainly through these, and through the direct observations, important information was obtained. The other activities were used mainly for verification and perspectivation. The interview guide conducted in Denmark soon proved to be constructed too narrow, more like a questionnaire where the answers to each question had to be filled in. They were therefore used to a very limited extend and only in the beginning. Instead, tentatively conducted interview guides were used, evaluated and redesigned after each interview according to the information obtained. Some of the answers given during the interviews were at times unambiguous and other ways of verification of the answers became very important. Whether the reason was the way in which the questions were asked, the complexities of the issues dealt with or the fact, that working through a translator exposes all information given for the translators personal interpretation, is hard to say.

In the following, the methods used are related to the different objectives and evaluated accordingly. In addition, semi-structured interviews were used for fulfilling all the objectives , therefore only the additional methods used, are mentioned below.

To fulfil the first objective direct observations and informal discussions were applied. An overview of the sources of income and things grown, could fairly easily be obtained through a systematic approach. More difficult was the wide range of vegetables, fruits, roots, insects, snails, fish, etc. collected outside the fields. They were used for many purposes, and it was almost impossible to get a complete overview of them. This could be due to a lack of experience in collecting non-systematic data, e.g. the questions were not asked in the right way, to limited time or gender bias: Since the men are generally the ones who we have spending most time with. The relevance of knowing the exact amount and kind of products collected for this report, can be discussed. The extend to which the longhouse dwellers are dependent on different kinds of subsistence products, can however influence the dependence on cash crops.

The participatory mapping was very useful and the informants were happy to share their knowledge. In a short time it gave us a good overview of the activities of all the bileks in the longhouses.

The second objective, the role of the different sources of income, was dealt with using rankings. During the ranking, questions concerning the most important of all the sources of income did not make sense. The different sources had different purposes, each purpose having its own importance. Rice is therefore incomparable with oil palm, pepper and paid labour, as it is a subsistence crop with a great cultural and religious importance. On the other hand, ranking of the various cash crops and the paid labour was to some extent useful, as they were sources of cash income and could therefore be quantified and compared (economic importance). It was, however, not always ambiguous and additional information was necessary for interpreting the ranking. For instance, in Merindun the income from the pepper was, for some of the informants, the largest, but the oil palm was ranked as the most important. This proved to be due to the fact that income from the pepper came once a year and was very dependent on the market prices, whereas the oil palm income came twice a month.

Using visual methods like ranking was a good way of obtaining information, and at times encouraged discussions among the informants. Though when conducting these, there is a risk of "RRA/PRA overkill", that is, underestimating the abilities of the informant. During a ranking, of the kind mentioned above, a man told us that the most important source of cash income was the one giving him the most, and he had the exact figures of income from all the sources. In spite of this we insisted on using the matches.

The third objective concerning time allocation turned out to be fulfilled in a slightly different way than imagined in the first draft of the project. It was dealt with using direct observations, informal discussions and rankings. The original thought of this objective was to quantify the time allocated to the different activities and compare these (at that time we did not know that rice was seldom bought and sold). This proved to be a too ambitious task, given our time frame. Quantification of time allocation, would require that each informer was followed in all his/her duties throughout the year. It is a very complicated issue to get ambiguous answers to during an interview, as many things are done alongside with others, and can not be differentiated independently and they may take place at different times of year. Again our systematic way of thinking gave way to the complexities of real life. The only activity with quantifiable time allocation, was paid labour.

In spite of the above mentioned difficulties, the direct observations, the informal discussions and the rankings were useful. During the direct observations a lot of information on cultivation methods, land rights, customs, income, etc. was obtained through informal conversations and discussions. They gave us a picture of the relative time allocated to the different crops, a picture that, in spite of the collapse of the original ideas with the objective, proved useful as background information for this report. The rankings were conducted as pair-wise rankings. Time allocation can be a difficult issue to rank, when having to relate to all activities at once. Comparing the different activities two at a time makes it easier to distinguish the most time consuming one of the two. This turned out quite well, and a good overview was obtained.

The objective concerning the use of chemical agents was, originally conducted to measure the environmental impacts of the different land use activities. Through direct observations we tried to get a quantified overview of the agents used. The answers given on the issue, during the interviews, were unambiguous, a uniform picture was therefore hard to obtain. To fulfil the objective as intended, we would need a more thorough study on field sizes and the market of chemical agents used. Moreover, equipment to measure chemical residues in the soil would be necessary. However, the interviews and observations gave some impression of the agents used, how they are used and to what extend. Investigations of soil erosion was another way of studying the environmental impacts of the different crops grown. For this, field measurements, estimation of soil erosion parameters and

informal discussions were used. They were relatively easily carried out and provided information accordingly.

In chapter 3 it was argued that the methods used lies somewhat in-between RRA and PRA, though most of the information was taken away from the survey site the informant however got something out of the study. Some of the informants told us that our questions during the interviews made them see their own situation in another perspective, made them consider where changes could be made. After each interview we spend some time answering questions, concerning e.g. the farming systems used in Denmark, hoping to give an impression of the situation we come from. Moreover the different mappings and rankings visualised the different issues and the information could therefore be shared with whomever came by during the activities.

The division of male and female informant groups were useful as the answers given by the women differed from the men, and gave an additional perspectivation to the already obtained information. It can however influence the results that most of the informants are men.

6.2 Summary

The methodology and the methods proved useful, though the objectives were not all fulfilled quite the way it was expected in the first draft of the project design. Many of the issues dealt with in the study turned out to be far more complicated and difficult to monitor than expected. Many of the issues in the objectives would take more time and supplementary field measurements to be dealt with as intended in the first draft of the project. In spite of this, we find that the methods used have provided a lot of information and results indeed valid for this report.

7. Conclusion and perspectivation

The results obtained through the PRA/RRA methods are somehow different from the work-hypotheses developed before the study was carried out. Though the RA methodology deals with complex and diverse systems, the expectations to the outcome of the study proved too systematic and uniform, compared to the actual situation at the study site. The information obtained was hard to quantify in an uniform manner, instead it provided a relative picture of the issues dealt with, including the many details and distinctions influencing the overall livelihood strategies.

Focusing on livelihood strategies, a wide range of issues have been dealt with. The focus has been on cash-crops, paid labour and subsistence activities, where the subsistence aspect, in specific, has been hard to systematise. The subsistence crops are, however, an important part of the livelihood strategies of the two longhouses, especially in times with declining prices on the cultivated cash crops. This reflects the risk spreading aspect in the livelihood strategies selected

The major difference between the two longhouses is the cultivation of oil palms, which supply the Merindun longhouse with a steady income. The difference is expressed through a smaller part of the bileks in Sebangki longhouse growing rice, pepper and rubber and a larger part undertaking paid labour, including migration work.

In the Merindun longhouse, involvement in the SALCRA scheme plays a large part as source of income. To some extent SALCRA can be seen as influencing the livelihood strategies in Merindun, in that, Sebangki has waged labour as the largest source of income, and this have only been observed to a limited extent in Merindun.

The question is whether the livelihood strategies of Merindun will change if SALCRA chooses to withdraw its development support. A possible change in livelihood strategies could be to introduce more waged labour as a stable source of income, as observed in Sebangki. Another, less realistic, possibility could be increased reliance on subsistence farming. In general the livelihood strategies seem to develop towards market economy, away from subsistence farming, independent of SALCRA involvement. The development in world market prices, development of land use strategies and to some extent climatic changes seem be the main actors in the transition towards increased monetarisation of the livelihood strategies.

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APPENDIX I

INTERVIEW GUIDELINE

1. Introduction

1.1 Our names, purpose of interview and general purpose of our stay. Be sure to tell the informant that no information will be passed on with direct reference.

1.2 What are your name(s)?

A) _____

B) _____

C) _____

D) _____

E) _____

F) _____

G) _____

H) _____

1.3 How many people are included in your household?

#:

1.4 Household history: For how long have you been living here?

Where did you live before?

2. Labour and landuse activities

2.1 Could you please tell us about the things you/your household do for a living ?

-- Try to include the division of labour --

Cash crops:

Area:

1) _____

2) _____

3) _____

4) _____

5) _____

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- 6) _____
- 7) _____
- 8) _____
- 9) _____
- 10) _____

Subsistence crops:

Area:

- 11) _____
- 12) _____
- 13) _____
- 14) _____
- 15) _____
- 16) _____
- 17) _____
- 18) _____
- 19) _____
- 20) _____

Hunting/gathering/fishing:

Species:

Where:

- 21) _____
- 22) _____
- 23) _____
- 24) _____
- 25) _____
- 26) _____
- 27) _____
- 28) _____
- 29) _____
- 30) _____

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3. Household income and time consumption

3.1a The cash-generating activities mentioned; Do you remember how much you got paid for them (\$/year)?

Activity #	\$ received
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

ALTERNATIVE:

3.1b The subsistence activities mentioned; Do you remember the amount harvested/gathered/hunted/fished/whatever?

Activity #	Yield/amount	market price of object
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

3.2 How much time is spend on the above listed activities of importance?

Activity #	Time used (days yr ⁻¹)
_____	_____

APPENDIX 2

TIME EXPENDITURE ON DIFFERENT TASKS BY PAIR-WISE RANKING

The eight tasks on the axes are compared relatively to each other, so the one that is listed is the more time-consuming.

The eight categories that are placed on both axes are :

- 1 - rice-growing
- 2 - pepper-farming
- 3 - collection of wild vegetables
- 4 - collection of vegetables around house
- 5 - collection of vegetables in the fields
- 6 - cooking
- 7 - going to market
- 8 - housework

Table 1 Measured USLE-factors and additional observations

Field #	Crop	S (degrees)	C ¹	P	age (yr.)	Observations
1	Rice	23	0.15	No tillage	1	ground cover: branches and stubbles soil 20 % exposed soil-surface colour: grey-brown
2	Rice	3-25	0.15	No tillage	1	ground covered 100 %
3	Rice	30	0.15	No tillage		ground cover: Many branches, dead ferns, rice straw
4	Rice	28	0.15	No tillage		soil-surface colour: grey
5	Rice	23	0.15	No tillage		ground cover: branches, stubbles, straw
6	Rice	0	0.15	No tillage	3	soil-surface colour: grey-light brown
7	Wet rice	0	0.15	No tillage		ground cover: dead biomass, weeds ²
8	Pepper	17		Mounding	23	ground cover: dead biomass clean weeded
9	Pepper	0				soil-surface colour: red
10	Pepper	19		Mounding, a little eroded	3	ground covered with mosses clean weeded
11	Pepper	11			0	soil-surface colour: red just planted, shaded
12	Oil palm	21	0.20		20	ground cover: palm leaves, mosses, ferns, full canopy soil not exposed
13	oil palm	14	0.20		20	ground cover: palm leaves, mosses, ferns, full canopy, soil not exposed

1: Based on Morgan (1995). There is no distinction between hill- and wet rice.

2: Because of late planting the area was weed infested.