Rumah Kajan Group

Impacts of land development on livelihood strategies in Rumah Kajan

SLUSE ILUNRM, MALAYSIA 2004

FINAL REPORT

Group members:

Marie Sigvardt
Alois Schuschnigg
Mads Olander Rasmussen

Supervisors:

Associate Professor Kristine Juul
Assistant Professor Tina Svan Hansen

Abstract

The study aims at evaluating the livelihood strategies of longhouse people of Rumah Kajan and their interactions with the Loagan Bunut National Park and the adjoining areas in terms of both natural environment and economic activities. The livelihood strategies of the longhouse households seems to be changing due to a number of reasons: increased need for cash for reconstruction of the longhouse, increasing emigration of especially younger males to urban areas, diversification of economic activities with increasing weight on wage-jobs and a decrease in farming area. The livelihood strategies are further influenced by insecurity in terms of land tenure because of the establishment of the National Park and especially because of other land developments e.g. oil palm plantations. They also rely heavily on income generated from Salambau fishing on the adjacent rivers, where signs of decreasing fish stocks have been identified possibly due to over fishing or pollution

Acknowledgements

We would like to express our gratefulness to Danida for financing this field study and to Robert Melong for organizing it. Further, we would like to thank our teachers Kristine Juul, Tina Svan Hansen and Ole Mertz for supporting us during our research project. Trying out methods in a real life context has been a great learning process, which have given us a better understanding of the strength and weaknesses of different methods.

We would also like to thank our Malaysian counterparts, Raymond Chung Chiun, Han Jong Kiam, Leong Chong, Li ChuinAmy, Chua Fang Lim, Nguyen Thi Hoang Hoa, Mancha ak Bagat, and Frankie Bendindang Manjah for a pleasant collaboration during our field trip. It has been a great experience, both socially and academically, to work interdisciplinary and internationally. Furthermore we would like to thank the Malaysian supervisors and our interpreter Nicholas for their support during our stay in Sarawak.

Last but not least we would like to thank the Mr. Kajan Sigeh and the people of Rh Kajan for letting us stay at their longhouse and for the patience they have shown during our interview sessions. We felt really welcome and grateful to experience everyday life in a longhouse.

Table of content

1. Introduction

This report is based on a joint field study course by SLUSE Denmark and Malaysia that took place from the 26th of January to the 5th of February 2004. The study area was the Loagan Bunut National Park and more specifically the Berawan community of Rumah Kajan or Long Teru, in Miri District in the State of Sarawak, Malaysia.

Borneo is known for its tropical dipterocarp forests and its large biological diversity, including many endemic species. However, logging, oil palm plantations and agriculture have been the cause of deforestation for many decades. These land development activities, besides off-shore oil and gas extraction also contribute heavily to the economic growth of the country. Today, palm oil production is one of the most important export goods in the State of Sarawak (Ismail 2004:1). Besides that, the land and the forests form a very important value for many of the indigenous people of Borneo, whose livelihoods depend on the forests for their natural resources. Land development and natural resource protection are therefore in some cases conflicting, especially because the social dimensions are often ignored and native customary rights of local people and their land tenure are restricted.

1.1 The study area

The Berawan community of Rumah Kajan is situated very close to the border of Loagan Bunut National Park (LBNP) at the confluence of the Teru and Tinjar Rivers. Their longhouse burnt down in 1998 and is currently under reconstruction about one kilometre upstream, closer to the border of the National Park. The reconstruction of the longhouse has emphasized the importance of cash-income activities, as many assets were lost to the fire in 1998 and building materials are expensive.

The Berawan are considered to be the first comers in the area and enjoy special rights to use the natural resources in LBNP. Traditionally the Berawan are hill rice farmers and other communities are spread further upstream of the Tinjar River as well as in the area of Mulu National Park.

1.2 Loagan Bunut National Park

Loagan Bunut is the largest natural lake in the State of Sarawak and is situated within the LBNP which comprises a total area of 10,736 hectares. The ecosystem of its peat swamp forest (PSF) is unique and very delicate. Therefore the area was protected as early as 1951 (SLUSE, 2003). In 1975 the Forest Department of Sarawak (FD) declared intentions to inaugurate the area as a National Park. The park was finally inaugurated in 1990 under the National Parks Ordinance and the statutes were published in the Sarawak Government Gazette (1991). Eight communities are living near or within the National Park. There are also a number of logging camps and oil palm plantations in the area. An UNDP estimate of the population in the nearest vicinity of the NP (one kilometre beyond its boundaries) in the year 2000 was 4,000 to 4,500 people (UNDP Project Proposal, 2000). However, under section 14 of the National Parks Ordinance, the Berawan community of Rh Kajan are considered the native population of the area and are the only locals accorded the exclusive rights to fish, hunt

and collect forest products, with restrictions, in the National Park area. They are also allowed to continue farming on their traditional farming areas inside the park. In 1998 part of the community moved and established a second Berawan longhouse, Rh Meran, situated within the NP, between the NP centre facilities and the town of Lapok. (UNDP, 2003)

1.3 Land tenure systems in Sarawak

There have been several conflicts over land between the indigenous people, the Dayaks[1], and various actors in Sarawak and Malaysia in general. The starting signal took place in 1841 when the British James Brook ("the first White Rajah") acquired Sarawak from the Sultan of Brunei, as a colony and introduced the area to a western conception of law. The Dayak tribes have their own traditional land rights, "*the adat laws"*, which are based on shared ownership and have been handed down from generation to generation. Individual land rights where the land can be bought and sold have not been a part of their belief system. These traditional laws therefore often clashes with western juridical systems. (Hong 1987:37f)

The Brooke era lasted until 1946 when Sarawak became a British Colony (Hong 1987:38). The goal of this colonial government was economic growth and rural development through eradication of shifting cultivation and promotion of intensive rice farming and smallholder cash cropping. They considered individual land titles to be a prerequisite to obtain this opposed to the community based land tenure of the longhouses (Cramb and Wills 1990:352) In 1957 the British wrote a Land Code, (which came into force in 1958), and even though Sarawak became a federal State of Malaysia in 1963, these laws are primarily the ones that are in use today. (Cramb and Wills 1990:352) This 1958 Land Code of Sarawak is a combination of the traditional juridical laws, which rules the state-owned land and of the *adat* laws, which rules the land that has been defined as Native Customary Land (NCL). (Ngidang 2003:204f) The 1958 Land Code stated that permission had to be issued by the District Officer for natives to enjoy any rights to land. In order to obtain this permission the land had to be occupied, cultivated, planted with fruit trees or used for burial grounds or shrines. All land was categorized into five different classifications;

Mixed Zone Land: is land anyone can hold title to.

Native Area Land: land which can be held by natives under title. However the meaning of 'native' is wide and includes the Sarawak Land Consolidation and Rehabilitation Authority (SALCRA) and the Sarawak Timber Industry Development Corporation (STIDC).

Interior Area Land: all land not categorized under any of the above mentioned title classifications. However the land can be classified as NCL if a permit is obtained.

Native Customary Land (NCL): NCL land is a sub class of Interior Area Land. It is basically IAL claimed by one or more native groups. It is not an official land title, as the state/government does not survey the land. It is though possible to get a permit (lease for 99 years) for the land, but as the land is not surveyed, the rights are not completely settled. All NCL belong to the state.

[1] Dayak is the name for the 20 different indigenous ethnic groups that live in Sarawak. They each have there own ethnic origin, religion, culture and language, although they share certain similarities (longhouses living, social organization etc.). (Kedit, 1989:2)

Reserved Land: this is State land used for various purposes such as protected forests and national parks. If an area is required for such a purpose, a notification in the Gazette can declare the area to be a Government Reserve. This is therefore one way of reclassifying NCL. (Hong 1987:47ff)

The situation between the Berawan, the LBNP and other land users (logging, plantations) is therefore very complex in a legal aspect. The area claimed by the Berawan seems to be accepted to a large degree by surrounding communities, but it is not officially classified as NCL. The National park Ordinance states that 'all NCR land which falls within the boundary of the National Park should be excluded from the park' (Sarawak Government Gazette, 1991:2418). However, it is not clear which land is NCL and which is not, but the statement indicates that they recognize that some of the land belongs to the Berawan as NCL land. This suggests that the farm land within the park area should be surveyed and then be excluded from the NP. However, the requirement for land to be classified as NCL is that it was used (planted with crops, trees or used for burial grounds, etc.) before 1958. Therefore, the Berawan could only claim land within the NP that was used by them before that year. The onus of proof lies with the claimant, which are the Berawan. Therefore, despite the Berawan are given special rights in the LBNP, there are still unsolved issues, which create great uncertainty within the community in terms of what their rights actually are. In relation to the land the Berawan claim outside the National Park, the land status is even more insecure as there is no official recognition of these claims, and other land developers can thus easier get permission for land developments as oil palm plantations.

Companies can acquire logging licenses for NCL and do selective logging on certain valuable timber species. The whole are around LBNP was subject to selective logging, including the NP itself (before it was inaugurated as NP). (Murtedza 2003:2)

Influences by both logging companies and oil palm plantations can have advantages and disadvantages. Advantages include improved infrastructure, through building of access roads and supply camps, employment opportunities and compensation payments. Disadvantages include the loss of resources through plantations, pollution, cheap immigrant labour pushing down wages, more people roaming in the area and loss of biodiversity. Most of these advantages and disadvantages probably influence the livelihoods strategies employed by the Berawan of Rh Kajan, but it is uncertain whether the advantages outweigh the disadvantages in the view of the longhouse inhabitants and what influence it has on the natural resource base in the Loagan Bunut National Park.

1.4 Objectives

The various land development changes (creation of LBNP, plantations, etc.) over the last decades impacts the Berawan in the area and Rh Kajan specifically. These changes open new opportunities for the community (improved infrastructure, cash income, etc.) as well as restrict their traditional livelihood strategies (increased regulations, decreased autonomy). Therefore the main objective is:

To assess the impact of Loagan Bunut National Park and other land development on the livelihood of the people of Rh Kajan and the impact of the resource use of the longhouse on the National Park and the surrounding community land.

The coinciding specific objectives are:

- To do an appraisal of the physical and human environment of Rh Kajan, including mapping of existing key natural resources and the community structure.
- To map household land use and past and present use of resources within and outside the National Park. To evaluate the evolution of land and fishing rights of the community of Rh. Kajan and assess the impact of resource use on the ecology of the National Park.
- To evaluate the changes in the fishing techniques employed by the community and to assess the economic and ecological viability of the *Salambau* fishing technique.
- To evaluate the role of various cash income activities for the different categories of household members.

1.5 Livelihood strategies

In order to assess whether the National Park has had an impact on the livelihood of the people of Rh Kajan or not, it is important first to establish what is meant by livelihood and what factors can influence livelihood strategies.

The concept of livelihood encompasses a lot of issues like assets and capabilities as well as different activities to make a living. (Scoones 1998:5) In relation to this Ahmed and Lipton defines livelihood as;

> "Livelihoods are the ways in which people satisfy their needs, or gain a living (Chambers and Conway 1992). A 'livelihood' is a set of flows of income, from hired employment, self-employment, remittances or (usually in developing rural areas) from a seasonally and annually variable combination of all these. A livelihood should be sufficient to avoid poverty, and preferable, increase well-being for a typical worker plus dependants." (Ahmed and Lipton 1997: 6)

Furthermore livelihood is about security and vulnerability over time. According to them livelihood security is the main focus of rural households and involves ownership or access to resources and activities that can generate income and thereby reduce present and future vulnerability (Ahmed and Lipton 1997:7).

According to Scoones the context (of politics, conditions, history etc.) and the livelihood resources determine the ability to pursue different strategies. The livelihood resources derive from different sources of capital, which he identifies as;

- Natural capital (the stock of natural resources)
- Economic and financial capital (the capital base)
- Human capital (skills, knowledge, ability to labour, good health and physical capability)
- Social capital (social relations, networks, associations etc.)

These stocks of capital and options of activities varies over seasons and years, but they also shift more substantially because of changes in conditions, external influences or personal factors like health conditions.

According to Scoones there are three options of livelihood strategies for rural people. They can diversify, migrate or increase their gains from agriculture either by intensification (increase output per unit area) or extensification (cultivate more land) (Scoones 1998:9).
Diversification means having a wide variety of on- and/or off-farm work activities for subsistence as well as income generation, in order to survive or improve standards of living. It is a strategy undertaken to reduce risks by spreading out the options of activities to make a living of. (Hussein and Nelson, 1998:3f) In this case a household who experiences a bad rice harvest can still survive because they also cultivate other crops, have a salaried job etc. However a number of constraints can limit the ability to diversify, such as lack of education, skills, credit, market access, labour or insufficient natural resources (Hussein and Nelson 1998:18ff).
Migration on the other hand refers to involuntarily and voluntarily migration and movement, both permanent and temporary. Reasons for migration are many and include education, employment, new/better land, family reunion or can be forced by economic or political reasons.
However different livelihood strategies can be combined within a household or community. If for example a person migrates out but pays remittance to the members still living in the household, he will be contributing to their economic resources and is thereby considered a component of their diversification. However, migration can also restrain the ability to intensify or extensify agriculture because it often requires increased labour (McDowell and de Haan 1997:19).

The objective of this study is to assess their livelihood strategy and if this has been influenced by the National Park and other surrounding land development schemes as well as the outcome of this e.g. whether their livelihood has an impact on the ecological environment of the National Park.

2. Methodology

The Rh Kajan team consisted of three Danish students, seven Malaysian students and one interpreter. The team members had various academic backgrounds and therefore different approaches and ideas how to deal with given problems. The specific methodology had to be worked out already being in the field and both synopses had to be converged in order to obtain the data required to answer our objectives.

Although, we had differences in what we actually wanted to get out of the use of certain methods and also differences in how to apply certain scientific methods in practice, we worked out a methodology, complementing each other with the various expertises available in the team. - Thereby making use of the interdisciplinary and intercultural aspect of our team.

We had 11 days in the longhouse of Rh. Kajan to collect data and observe the current situation. We had a good insight into their daily activities and habits, since we were living amongst the people.

In the team we had two Iban students, who were able to communicate with the locals as well as one interpreter. Interviews were always conducted in Iban and directly translated by the native language speakers into English. Therefore, the non-Iban Malay students and Danish

students could take an active role during interviews. However, it is acknowledged that translating from one language into another is subject to interpretation and therefore could potentially introduce biases, which to a certain degree could limit the viability of our results.

The methods we employed during the fieldwork were:

1. Household survey, questionnaire and structured interview
2. Semi-structured interviews with individuals and groups
3. Focus group interview
4. Informal conversation
5. Observation
6. Remote Sensing and GIS
7. Water analysis

2.1 Household survey, questionnaire and structured interview

A questionnaire was used to collect quantitative data about the village-inhabitants (see appendix D). The questionnaire was designed as to fit the definition of a *general household survey* (Casley & Kumar 1988: 55), thus to cover demographics, activities, income and indicators of the well being of the longhouse inhabitants. As an extension to this, some questions have been added to obtain more in-depth information on the land use and fishing practices, as this is the main focus of this study. Most questions were phrased as who? why? what? where? and when? as recommended by Mikkelsen (1995:109). Besides when the answers raised further important issues, we asked in-depth and open-ended questions into these, thus not leaving out relevant information. However this information could not be quantified but merely used as an understanding of the respondents other answers.

The interviews were usually conducted in groups of three, consisting of one Iban speaker (either the interpreter or one of the two ethnic Iban), one other Malaysian student and one Danish student. All households were interviewed, as only 20 households were present in the longhouse compared to the total of 56 households. Some of the households interviewed were not actually living in the longhouse for the majority of the time, but this has been accounted for in the results. The respondents from these households were people the headman had asked to show up. The advantage of this was that we got a wider picture of the people who are connected to the longhouse and also an explanation of why some of them move out temporarily. However, the disadvantage was that we do not know who was called in for these sessions and who was not, e.g. did we miss out on the people too busy because of jobs in the logging camps, the plantations etc. or did we only talk with the wealthiest people and the ones with transportation opportunity to come? This of course limits the representative quality of our results.

We chose to conduct the questionnaire on a household basis, as this level provides the optimal trade-off between numbers of people being interviewed and the obtained information. In most cases the interview was carried out with the head of the household (usually the oldest man in the family) but often the head was accompanied by other household members that helped answering the questions. Especially the questions related to income and expenditures where often answered by more household members, which probably increased the viability of the data. The definition of households used in this study differs slightly from conventionally used definitions, in that people staying outside the longhouse are counted as being part of the

household, as long as the person contributes to the economy of the household or if it is children who study and therefore live somewhere else. To fit the definition of livelihood mentioned above in section 1.5.

Despite the different limitations we found that the information we obtained during these sessions gave us valuable information of past and present land and resource use, work activities, sources of income etc. Though, the limited number of respondents limits the quality of the data and might introduce biases as several of the investigated factors might be determining for whether the household is present in the longhouse or not. Statistically a sample of 20 makes it difficult to work with levels of confidence and do statistically tests, as the sample size is simply too small.

2.2 Semi structured interviews with individuals and groups

Semi-structured interviews were conducted with key informants and in advance of every interview, a topic list was created to lead through an interview and as a check list for the interviewer in order to cover all topics required. However, the interviews were kept flexible in the sense that the topic list was only a guide and that the interviewee had the chance to go into depth in topics of importance in his/her perception. This also gave us the opportunity to gain information that we have not thought about in advance.

Group interviews were conducted with fishermen and farmers in order to gain in-depth information about issues concerning these groups. For the fishermen the issues were primarily concerning changes in fishing methods, changes in number of fishermen and time spend, water quality, the stock of fish, changes in fish species, access to market and prices. The questions related to farming were past and present land use, land rights, the change away from farming, crops cultivated, productivity and use of fertilizers etc.
The advantage of these group interviews was that the various respondents could complement themselves and also advance into short discussions about certain topics, which gave us valuable insights in which areas the people actually have different opinions. The difficulty in group interviews was usually to involve everyone within the group to take an active part. However, this was not always possible as some respondents were more active than others and some hardly participated at all. Another point to make is that the respondents of the group interviews with fishermen and farmers were almost entirely the same individuals, as they are engaged in both activities. This had the advantage that they got more used to us and therefore responded more freely and engaged in free discussion easier. On the other hand the disadvantage was that, in terms of general issues such as their views on the National Park or on plantations activities, we got the same responses over and over.

Individual interviews were conducted which usually required more preparation in advance, as the topics we wanted to explore had to come entirely from the interviewer because the respondent did not usually engage into in depth discussion.

The interview respondents and the main issues:

- The headman of Rh. Kayan: community structure, history of Rh. Kajan, access to land, key resources, land and fishing rights.
- The headman of Rh. Meran: reasons to move, relationship with Rh. Kajan, land and fishing rights.

- The paramedic at Loagan Bunut Health Clinic: main health issues concerning Rh. Kajan.
- Principal and teacher at the primary school, Long Teru: level of education/ how many goes on to secondary school.
- Farmer: visit to his farm to measure the area.
- Fisherman: visit to his Salambau and demonstration of the technique.
- National Park warden: NP boundary, effects on Rh. Kajan, tourism.

2.3 Focus group interview

A focus group discussion was carried out with three groups, the adult men, women and youngsters in the age group 19-28 years old, with five to six respondents in each group. The objective of this form of interview was to gather information about their perceptions of the National Park, their viewpoint on their land and fishing rights, the relationship with Rh. Meran and their hopes and expectations for their own future and the longhouse. These discussions gave us valuable insights into their joys and worries, which we would not have been able to obtain from more structured/formal interviews.
However we experienced problems getting the discussions started and in some cases asked leading questions with the intension of triggering them to argue and discuss the issues. This affects the validity of the information gained, since they might have been in defensive and responded according to what they thought we wanted to hear. Another problem was the language barrier, which made the discussion less fluent, because it had to be translated along the way.

2.4 Remote Sensing and GIS

GIS techniques were used during the entire stay in the area, to collect information on the location of observed features and places of specific interest. GPS points were collected at the water sampling points, at visited farming plots and other places of interest to allow plotting on maps subsequently. GPS routes and track-logs were mainly used during transport on either the river or the road, to allow rectification of the remotely sensed data and to map any changes in the infrastructure not present on the available maps.

To verify the location of major land cover classes in the area and to identify major land cover changes in the area within the last 15 years, two Landsat (E)TM scenes were analyzed. The scenes were acquired on August 8th 1991 and on September 10th 2001 and both cloud-free. As the remote sensing data have mainly been used for identification and verification of large land cover changes, only an approximate rectification has been carried out, but maps shown later will be based on the location derived from the GPS data collected. An attempt were also made to track changes in area under cultivation using the two Landsat (E)TM scenes, but this proved not to be possible due to the timing of the scenes available compared to the farming calendar.

2.5 Water analysis

In order to determine if land use activities, such as oil palm plantations and logging activities, have an influence on the water quality in the surrounding rivers, which is one of the most important resources for the people of Rh Kajan, water tests were carried out in the Teru River and the Tinjar River.

Two samples were taken from the Teru River, one above the confluence with the Bunut River and one further downstream, closer to the confluence with the Tinjar river, as can be seen on the map below. The Tinjar River was tested just downstream of the longhouse.

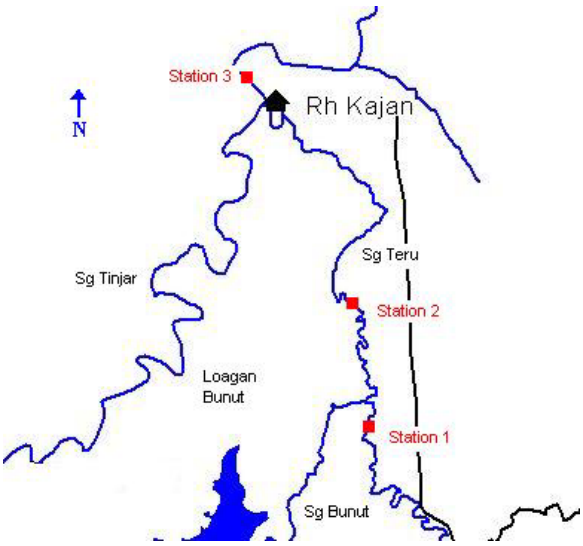


Figure 2.5.1: Water Sampling Points

Limiting the viability of this methodology is that water samples could only be collected on one day, which does not represent the water quality over a longer period of time. Secondly, the water level in the rivers was extremely high (about 10 metres in the Tinjar River) after heavy rains. Thirdly, only two samples per sampling site were taken, whilst the optimum should be three. Fourthly, only three sampling sites were chosen in two rivers. The consequences of these limitations are that the results can only be used for a rough indication of water quality at the time of the field study. For a complete analysis of water quality of the surrounding rivers of Rh. Kajan, and therefore the effects of various land uses on water quality, more thorough testing would be required in different seasons and a longer period of time and significantly more testing sites in the rivers concerned.

2.6 Delimitations and limitations

Several limitations have been encountered during the preparation for and the actual field study. These were mainly concerned with the application of scientific methods.

A social ranking of different work activities was planned to be facilitated in the last quarter of the field study. However, through a lack of organisation by the students and other reasons, no respondents turned up that evening. Therefore, the exercise could not be performed. The purpose of this ranking was to assess which activities they found important and preferred, which could have helped us establish what livelihood strategy they pursue and why.

Another limiting factor was that we only stayed in one longhouse (except for a short visit to Rh. Meran), which limit our understanding of the context of issues concerning Rh. Kajan, especially related to access to land and land rights, and which does not give us the opportunity to compare and cross-check our findings.

3. Results and analysis

3.1 Human environment

The questionnaire survey conducted provided the majority of the results presented in this section. A total of 20 households having a total of 205 persons were surveyed. Of these 205 persons we received enough information on 185 to include them in the analysis, though not all information was obtained for all persons. Table 3.1.1 shows the basic demographic statistics for the longhouse inhabitants.

Number of households	20
Number of people	205 (185)
Gender distribution	94 males (50.8%), 91 females (49.2%)
Location of actual residence	105 in longhouse (56.8 %), 80 outside (43.2%)
Average age	Men: 28.54, Women: 24.45

Table 3.1. 1 Basic demographic statistics for the inhabitants of Rh Kajan

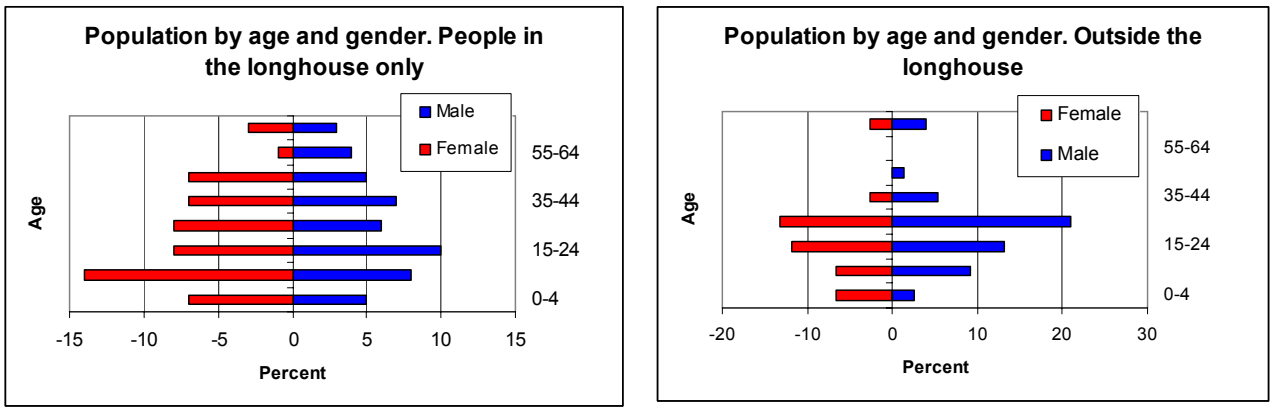


Figure 3.1.1 Population for the longhouse. Blue are men, red are women

Study of the human environment of Rh Kajan shows clear signs of migration patterns, since almost half of the people surveyed do not actually stay in the longhouse (table 3.1.1). Figure 3.1.1 indicates that it is mainly the younger generation that migrates, since the population in the longhouse has less men and women in the age from 15 to 24 and especially in the age from 25 to 34.

Figures 3.1.2 show that the population in the longhouse is generally less educated than the part of the population staying outside (please note that people that are still under education and over 14 are counted as having finished the level of education that they are currently studying). For the longhouse people most have only attended primary school (45%) while the percentage for the people outside is 16%. More important is it that only 2% of the longhouse people have attended more than secondary, compared to 29% for the population staying outside. Further analysis shows that it is especially the well-educated young men who migrate to work outside, and that the majority of the older generation living in the longhouse has no education or only primary schooling.

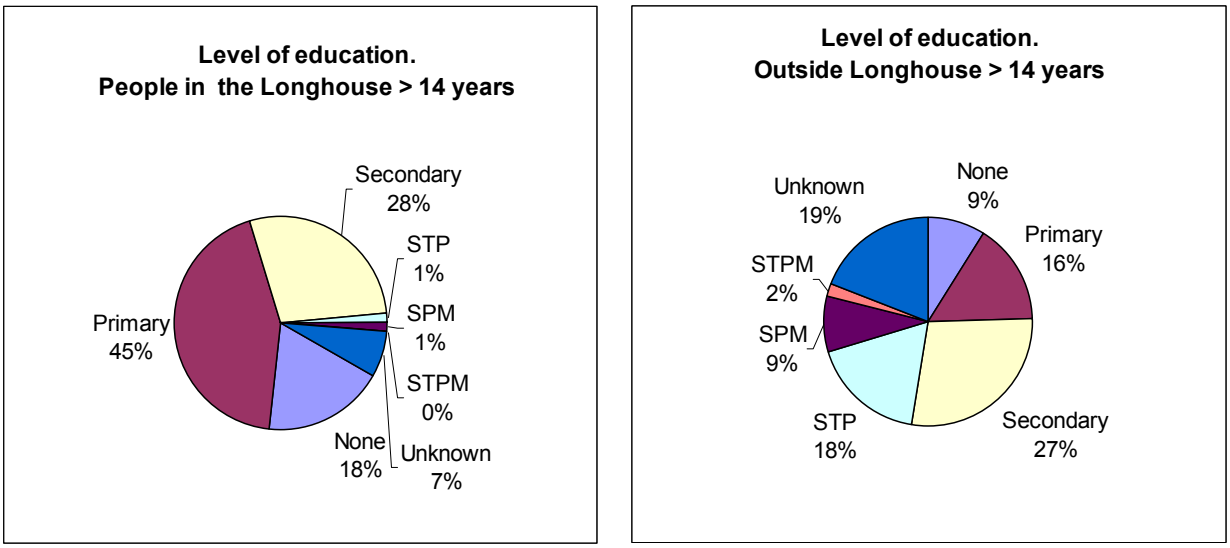


Figure 3.1.2 Main occupation within the last year. In this figure the farmers also do fishing (especially during the peak season) but the fishers do not farm.

A study of the difference in occupation between people living in the longhouse, working close by (and returning to the longhouse during weekends etc.) and people who is permanently settled outside (who only return for special occasions and some for the peak fishing season), indicates that people migrate out for salary jobs. Figure 3.1.3 shows that there is a substantial amount of people in labourer positions outside the longhouse, while people staying at the longhouse are mainly occupied with farming, fishing or within the household, only a few of them have salaried work. The second group has a few occurrences of people within plantations and logging but also some students (usually secondary school pupils that go to school in Marudi). The largest parts of group 3 are either labourers in varying sectors, or housewives.

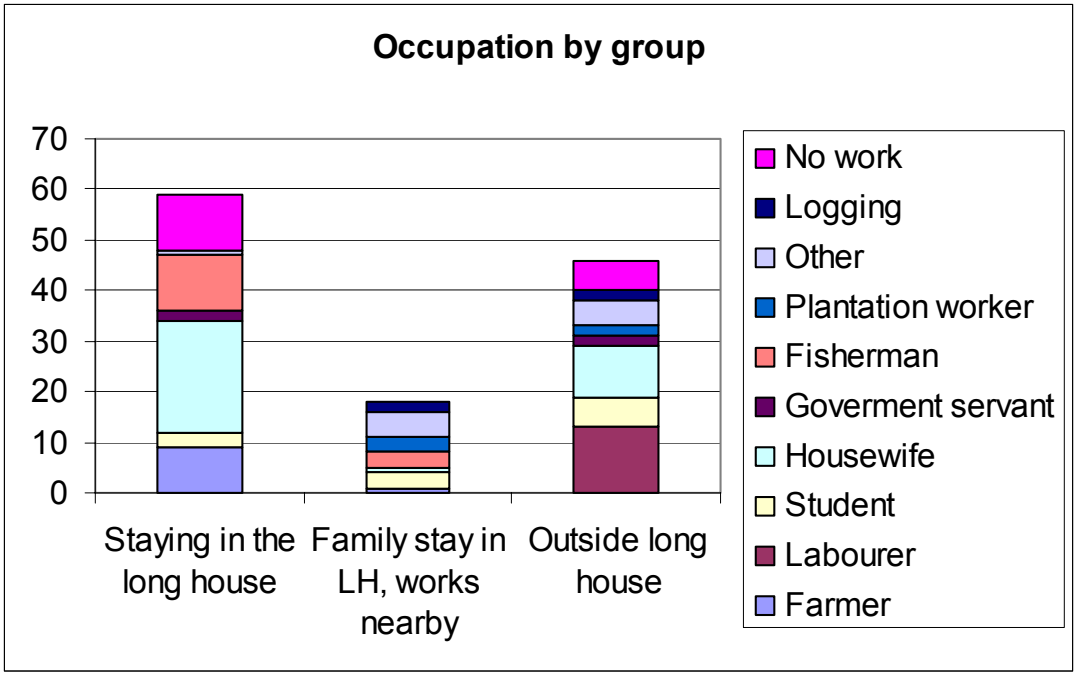


Figure 3.1.3 See text for discussion of the figure.

3.2 Physical environment

Figure 3.2.1 shows a map of the area containing the most important features. Rh. Kajan is placed just outside the National Park Boundary at the confluence of the Tinjar and Teru rivers. The longhouse was earlier located a few hundred meters further downstream but moved (back) to its current location after the fire in 1998. The green areas east and south of the NP are oil palm plantations. The big plantation to the east of the park was established between 1991 and 2001, the others to the south are older (before 1991). The area marked in red indicates what the headman of Rh Kajan sees as their area of influence. This claim to the land is not official as can also be seen by the fact that the large oil palm plantation has been established within this area.

Another interesting area is the area on the east bank of the Tinjar River between Rh Junggang and Rh Paking. According to the official papers regarding the National Park the only ones allowed to use this area are the Berawan of Rh Kajan (and Rh. Meran) but are not marked by the headman as their land on this map.
It should further be noted that their lands also expand far south of the National Park boundary. It is in this area south of the lake that most of the farming activities are taking place as described in section 3.4.2, but several land holders complained about encroachment on their lands after the construction of the south and east going roads within the last 10 years. Most of this area both inside and outside the park has been logged during the sixties, but the logging activities have now moved south and is currently only active in the area around Lapok.

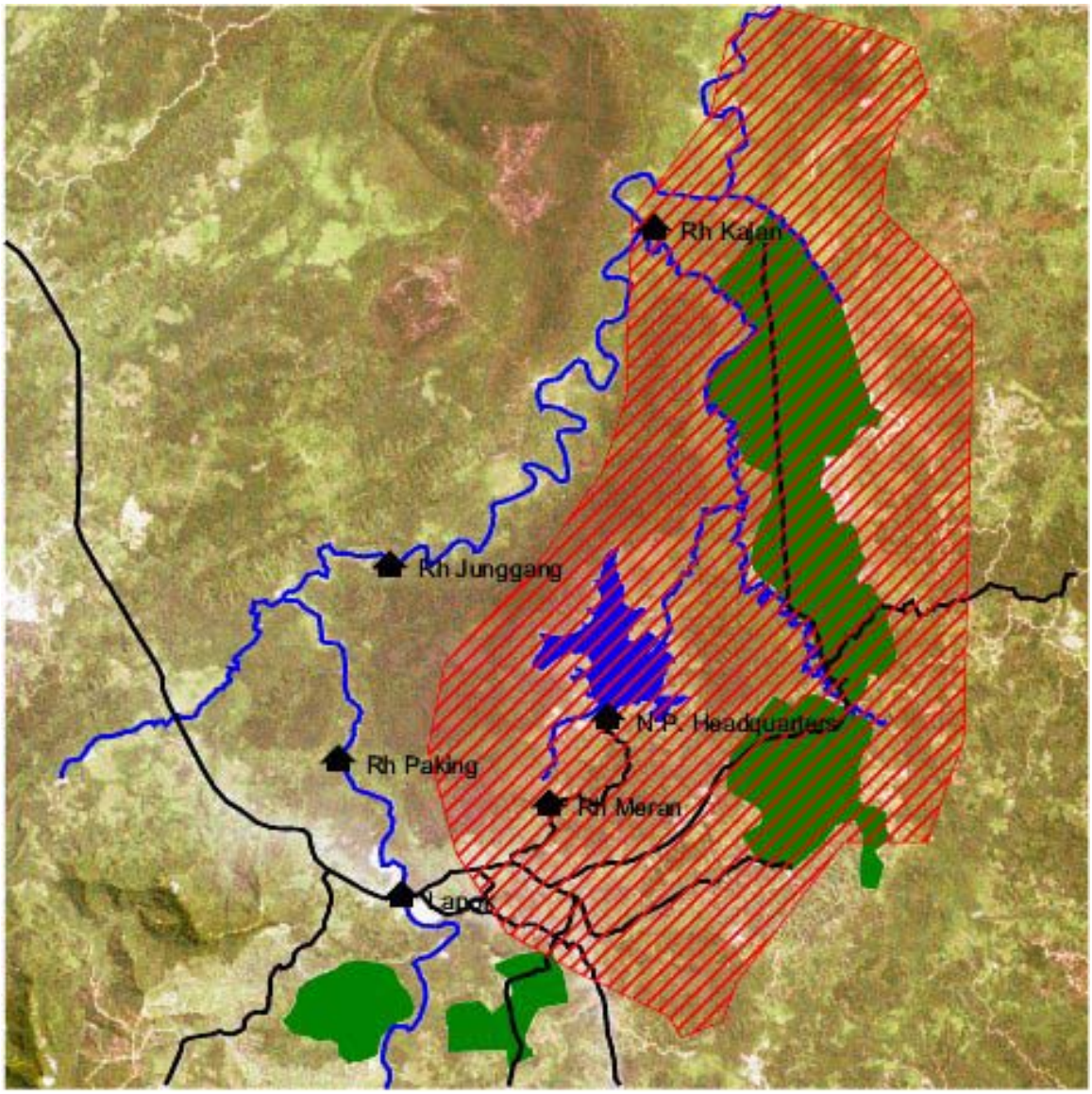


Figure 3. 2.1Map showing the national park area, the long houses, the oil palm plantations (in green) and the area of influence of Sigeh Kajan (in red) on top of a Landsat ETM scene from 2001 (band 3, 2, 1 composite)

3.3 Land and fishing rights

During an interview with an elderly woman (80+), the respondent told us that her great-great-grand father married a lady by the name of Berawan, which later became the name of this ethnic group. However, we do not know the year of this event, but the people of Rh Kajan all agree that they have moved around but have been living in this area for generations. During the period of the Brunei Sultanate they were living in the Loagan Bunut area, but were forced by the White Rajays to migrate to Long Teru, apparently because of easier access to the river. This indicates that the Berawan are living in the area of Loagan Bunut for at least 160 years. This story comply with a study done by Peter Metcalf, who further writes that the Lelak people (later Berawan) had lived at Loagan Bunut Lake 'for ever' and only moved to Long

Teru in the end of the nineteenth century. Further more nobody lived at Long Teru or anywhere else along the Tinjar River until the nineteenth century (Metcalf, 2002:78ff).

As indicated by the headman the area of influence of Rh. Kajan and Rh. Meran includes almost the entire NP but also extensive lands outside the park, as indicated in Figure 3.2.1. However, this can not be verified on a legal basis as the Berawan most definitely did not cultivate (plant with fruit trees) the entire land they claim, which is the only way to secure NCL rights to an area.

Asked about their perceptions on the NP, most people of Rh Kajan feel that they have received both gains and losses from the NP. In a way they feel restricted and robbed of their land rights, but on the other hand satisfied, because there is a better control over the fishing. They mentioned that before the establishment they were experiencing problems with other communities fishing in 'their' area. Besides, the NP provides better jobs, income opportunities and has improved the infrastructure. However only a few people have been employed by the NP and thereby been able to enjoy these benefits, but most of the people mentioned that they expect more benefits from the NP in the future and they feel that the park is not totally unnecessary (See figure 3.3.1), the reason being the amount of tourists that it might attract, which they hope will provide them with jobs. One of their concerns, however, related to this is the future aspect of farming. Although the Berawan community is allowed to cultivate their NCL they are not allowed to clear primary forest. Their concern is therefore, that if they leave their land fallow too long, they will have a weaker position to claim rights to the area. This issue is relevant as the NP area is mostly secondary forest and therefore it is difficult to distinguish between forest and areas under long fallow. Furthermore, there is a high degree of uncertainty over the farming land within the park as it is not clear which land is excluded from the park as NCL (as stated in the National Park Ordinance). Most of the people stated that in order to depend less on the NP in the future, they would have to reduce their land and resource use within the park area. This suggests a decrease of natural capital, which could lead to further migration and need for salaried jobs.

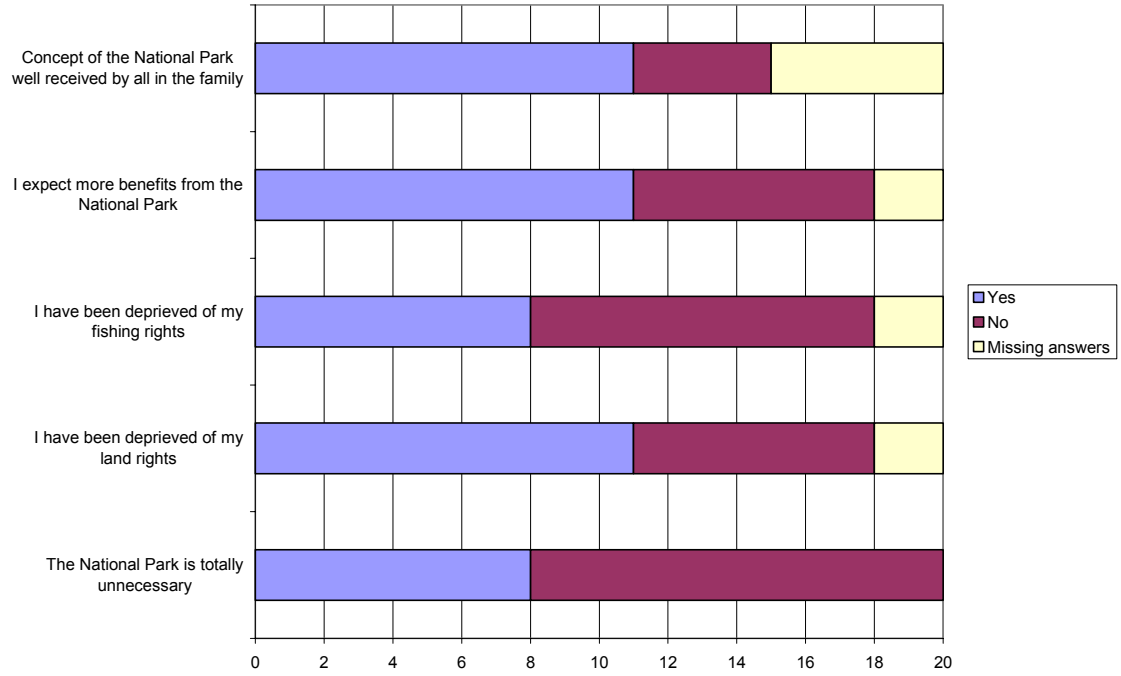
Additionally, there seems to have been a dispute between the headman and the former headman's assistant (now the headman of Rh. Meran), who asked for permission to settle at the current place of Rh. Meran to get better access to the road. Therefore the Berawan people are now split in two communities. The headman of Rh. Meran is of the opinion that 'his' community is placed at the Berawan's original place, while the people of Rh Kajan oppose to that and thinks that the only reason why they moved was better cash income opportunities. The headman of Rh. Meran told us that they have suggested the community of Rh. Kajan that they get their farmland surveyed to secure their rights to these areas. Surveying the farming land would remove the uncertainty about rights to land within in park. However, once surveyed there is no chance anymore to increase faming area or demand other rights. The headman of Meran consulted the headman Kajan about this issue, but Kajan does not want to survey and prefers to leave the issue as it is at the moment. Additionally it is questionable if Land and Survey and the NP authority actually would like to survey the farming land in the park. This came out during an interview with Mr Meran, fearing that the authorities pursue to goal of 'phasing out' farming rights in the park area slowly and therefore do not want to do anything that would give the Berawan a legal basis to claim their rights (e.g. official papers that quantify and locate farming land in the park area). Another reason why the authorities probably do not want to survey the land could be that they then would have to reclassify NCL to titled land (e.g. Native Area Land). This is not only a problem for the Berawan, but is a general issue that the state refuses to settle conflicts about native's claims for NCL.

The two headmen clearly have different strategies to secure their rights for the future and also have different ideas of how to increase the wealth of their people. However, the relationship between the two longhouses was difficult to research further as people did not feel comfortable speaking about it and our Malaysian counterparts thought it was too sensitive an issue to ask questions about.

The younger generation seems to be most satisfied with the NP, pointing to the job opportunities, while the adult men are supportive of the NP because they feel their fishing rights are secured. However the women seem to feel more restricted in the sense that they are afraid to go there to collect forest products because of the park rangers although they are still allowed to. However, most of the people mentioned that they accept the park because they have to (see figure 3.3.1), if given the opportunity they would have opposed the establishment, because they cannot do the things they used to (hunting, clear virgin forest etc.). The phrasing 'Concept of the NP well received by all in the family' should therefore have been asked differently in the questionnaire, since the yes/no answer could suggest that they agree with the concept, which they do not.

The oil palm plantation seems to be their biggest concern. They feel that their land rights have been severely intruded. The longhouse inhabitants who had cultivated land in the area of the Lelak plantation got a compensation of RM 1,000 for the loss of their land. People were promised jobs and certain benefits if they worked more than 20 days a month, but when the plantation was established the owners failed to keep their promise, instead they had hired migrant workers, mainly from Indonesia, who were willing to work for a much lower salary. Some of the people from Rh Kajan worked there for a couple of years, but stopped because they could not support their family on their wage. The third reason is the decrease in the stock of fish, which they think is caused by pollution from the plantation. This is also one of the reasons why some of them feel deprived of their fishing rights. (See figure 3.3.1)

Figure 3.3.1 Perceptions of the national park



3.4 Land and resource use

This section will present and discuss the findings on water consumption, water quality, farming, livestock production and the use of forest products. Fishing as a land use activity will be treated in section 3.5.

3.4.1 Water consumption

The main source of water for drinking, cooking and washing is rainwater. During the dry season the community is partly dependent on river water when the tanks run empty. The river water has to be filtered and cooked before consumption but even then sometimes causes problems. As indicated by the local paramedic, incidents of diarrhoea and vomiting are more frequent in the dry season. People also complain that they often get itching skin in the dry season and they prefer not to drink the river water as long as any other water source is available.

In an attempt to determine the influences of outside land uses, such as oil palm plantations and logging operations on the aquatic system, the river water has been tested to determine whether these activities have an influence on the water quality of the surrounding rivers. However, the result must be understood keeping in mind the limitations stated in the Methodology.

The Department of Environment (DOE) has established a river classification system for water quality. There are five quality classes, where I is of highest and V of lowest quality (Menon and Murtedza 1999: 137). The classification system can be seen in Appendix B.

Classes I and II represent water bodies of excellent and good water quality that meet the most stringent requirements for human health and aquatic life production (class II requires conventional treatment for consumption e.g. boiling). Class III is moderately tolerant for aquatic species but can be used for livestock watering (for consumption advanced treatment necessary). Classes IV and V are of low quality and can be used as irrigation water for non-sensitive crops (should not be consumed) (Menon and Murtedza 1999: 137).

The table below shows the results of various water quality parameters with the according quality classes.

Two rivers were sampled: 2 samples in the Teru River (above the Bunut confluence and below the Bunut confluence) and 1 in the Tinjar River (below the Tinjar- Teru confluence).

Table 3.4.1: River Quality Parameters

	Unit	***Station 1 Sg. Teru***	***Station 2 Sg. Teru***	***Station 3 Sg. Tinjar***	***Quality Class***
Temperature	^{o}C	25.6	25.8	25.0	
pH		6.6	6.2	6.2	**I-II**
Dissolved Oxygen	Mg/l	4.5	5.9	4.2	**II-III**
Conductivity	µS/cm	284	235	179	**I**
Chem. Oxygen	Mg/l	11.5	26.0	12.0	**I-II**

Demand					
Turbidity	NTU	50.1	32.6	63.6	**I-II**
Total Dissolved Solids	Mg/l	182	152	115	**I**
Total Suspended Solids	Mg/l	13.5	10.2	13.7	**I**
Phosphorus	Mg/l	0.06	0.23	0.13	**I**
Nitrate	Mg/l	0.08	0.00	0.08	**I**
Ammonia	Mg/l	1.17	0.043	0.21	**II-III**
BOD_5	Mg/l	3.9	4.32	3.24	**II**
Faecal Coli form	Col/100ml	20	100	180	**I-II**
Total Coli form	Col/100ml	840	520	750	**II**

Most parameters fall into Class I and are therefore excellent. The only high classes are found for Ammonia and Dissolved Oxygen. The Ammonia content seems to be relatively high, although it varies in a high range, even in the same river. High variations of ammonia in the same river are possible, but the variations of the results above seem to be too high, ranging from 0.04 to 1.17 mg/l in the Teru River. This suggests that these reading are not entirely correct. The Dissolved Oxygen readings are in the range of Class II and III. This indicates that the amount of oxygen in the water is relatively low, which favours organisms with a low oxygen demand, such as anaerobic and pollution resistant species (e.g. algae, etc.). The other higher classes (but still of good quality) are the COD, BOD_5 and Turbidity as well as the Total Coli bacteria count. Between the two rivers there are no distinctive patterns except that the faecal bacterial count is higher in the Tinjar River, which could be an indication of the higher population living on this river. However, even this number is still considered low according to the standards.

Therefore it can be concluded that the water quality of the rivers surrounding Rh Kajan is generally good at the moment. However, as respondents indicate, there are problems with river water quality in the dry season when the water levels are considerably lower.

According to interviews with longhouse occupants, river water quality has decreased over time e.g. the water used to be clearer. They mainly blame the oil palm plantations (fertiliser and pesticide discharge) and logging operations (siltation, timber barges). However, the results above do not verify this as all parameters were in an acceptable range, keeping in mind the limitations stated in the methodology. A more thorough analysis, as mentioned in the Methodology, could show a relation between land use activities and water quality. The reasons of deteriorating water quality cannot be the activities of Rh Kajan, as there is hardly any farming land directly on the Teru River, but must come from other sources further upstream. The water quality is of utmost importance for local people as water- and fishing resource, and considering the responses by people that the quality is getting worse, there is need for further, more thorough research.

3.4.2 Farming

Farming is one of the main activities undertaken by the people of Rh Kajan. The main crop cultivated is rice. Two cultivation systems are used, wet rice- and hill rice cultivation. The cropping season lasts from June to March. In the time between June and July, land is cleared and burnt to create a suitable seedbed. In July to August the rice is planted and then harvested around February to March.

The wet paddy cultivation area is cropped permanently whilst the hill rice area is under shifting cultivation. The hill rice fields are cropped for about three seasons and the average fallow period is nine years. This is considered as a forest fallow system (*temuda*), where the fallow land is partly managed by planting fruit trees and therefore is not considered "abandoned" (Ngidang, 2003). Land preparation and crop husbandry is done by hand without any mechanization. Weeding, transplanting and harvesting are mainly done by women. Land preparation is often done on a communal basis via the *gotong-royong* service, where the community shares the effort and works together to ease the hard work of clearing and preparing the fields.

As the wet paddy is temporarily under water and the hill paddy is shifted frequently, weeds are not a major problem, according to interviewees. If weeding is necessary it is only undertaken when the crop is still in a seedling stage. Pests are causing more trouble and most farmers are using chemical pesticides to overcome this. Chemical fertilisers are used in small quantities at the time of planting.

The main cropping areas are within the National Park, on the southern park border and close to the road from Lapok to the logging areas further south. The main reason for cultivation in the NP is the slightly higher elevation and therefore less risk of flooding. Closer to the longhouse, flooding is frequent and therefore farming is less suitable. Due to the large distance between the fields and the longhouse, many farmers have farmhouses which are occupied during land preparation and planting. Mapping the field locations inside and outside the park in order to determine favourable farming sites was not possible due to the distance to the fields and the fact that only very few farmers were staying in the farm houses at that time.

Rice is mainly grown for own consumption and not for sale and this determines the area of cultivation. The average cultivation area (actually cropped) per year is 2.5 acres (approx. 1 hectare) per household. As land is in excess supply the actual size of land potentially available for cultivation is hard to determine by the community. Some respondents indicate that field size increased as land preparation became much faster through the introduction of chainsaws. However, the total land area under cultivation by the entire community has decreased as more people have stable incomes and are not dependent on rice cultivation any more or rather do not have the time for cultivation. This shift of time allocation from subsistence rice cultivation to other cash income activities is also consistent with other studies conducted in Sarawak (Mertz et al, 2003: 18).

The rice productivity is difficult to determine as the product is usually not sold and therefore not weighed. Indications were given in how many 'sacks' are harvested per year per acre in the questionnaire. Unfortunately the data is very inconsistent, as many interviewees could not respond to their productivity. The data can be considered more an estimate of the quantity of rice required for self-sufficiency than actual field productivity, as the respondents seemed to think in sacks of rice required for consumption per year rather than sacks produced on their fields last year. More reliable data could have been obtained if the harvested rice was

weighed, which could not be achieved as at the time of our visit, harvesting was just about to start.

Most farmers used to get government subsidies for their rice cultivation in terms of cash and fertiliser. However, today hardly any farmer receives subsidies as the rice is only grown for their own consumption and the area therefore quite small, which does not stand in relation to the effort of applying for subsidies. Furthermore, the local Agricultural Department subsidiary has moved from Long Teru to Marudi, which significantly increases the effort for subsidy applications.

Next to rice, pepper and various fruit trees, such as banana, also rubber trees are found close to the rice fields. Pepper is mainly for own consumption but is also sold if in excess supply. Farms that are situated close to the logging road on the southern border of the National Park often have small fishponds. When the road was constructed the construction company dug ponds for all the farms on the way. In the ponds Red Tilapia are reared all year round. The fish is mainly consumed by the occupants of the farmhouses and is also sold locally.

According to interviewees the Berawan have reduced their resource use within the National Park since its establishment in terms of farming land. However, this is probably rather due to the decrease of households in the longhouse as well as the reduced need for rice cultivation than due to the regulations of the NP. Furthermore, since these activities are primarily for self-sufficiency and not to generate a surplus for trade, it should not be a concern for the ecology of the NP. Another reason for this is that the Berawan people, like most indigenous people of Sarawak, do shifting cultivation, which is considered a common conservation practice as long as fallow periods are long enough to regenerate soil fertility (Ngidang, 2003:207). As long as there is no pressure for agricultural land, the impact of farming on the NP will be relatively small.

3.4.3 Livestock

Livestock production is not a major activity in Rh Kajan. Traditionally the Berawan never kept livestock on a scale larger than to support their own needs. As the land is prone to flooding and the climate does not allow bovine production due to the high humidity, virtually no large animals are kept in the area (the Rumah has one pig). Some households keep chickens for their own consumption (to a maximum of 15 birds per household) to supplement their nutrition. However, the community used to have more livestock, mainly pigs, before their longhouse burnt down in 1998 (when they lost the pigs). Pigs are held in pens elevated on poles and are not roaming. Therefore, they are better protected from flooding. It can be expected that at the moment livestock production in Rh Kajan is especially low but will increase once the construction of the longhouse is finished which will release resources for other investments.

3.4.4 Forest products

The forest resource is used to collect food (plants and animals), timber and materials used for handicraft. It plays an important role for the local community in terms of their cultural heritage. However, people do not depend on these resources and, except jungle vegtables, collect them on a very infrequent basis.

In terms of plants, various jungle vegetables such as ferns are collected next to berries and wild fruits. Jungle foods are collected on a frequent basis in small quantities for local consumption. Many products are found close to the riverbanks and are collected during fishing trips by men.

Other jungle food sources are wild boar and small monkeys which are hunted mainly with guns. Other animals used for cultural purposes (clouded leopard, hornbills, etc.) are protected today and not hunted anymore. Deer is traditionally not eaten by the Berawan, however today it is sometimes consumed. Reptiles, such as snakes and monitor lizards are killed if caught in the fishing nets but not specifically hunted for. Today men mainly hunt as a hobby if they have time to do so and it is not a commercial activity.

Forest products for handicraft production are important as they are used for various materials. Rattan is used for mattresses and baskets which are used for processing rice, bags, etc, which are mainly collected and processed by women. Hardier rattan species and bamboo are used to make fish cages which are used to store and transport fish. Leaves are collected for food processing (rice cooked in leaves) and the traditional *Salambau* nets are made from liana. However, today people are not reliant on these products and they are collected infrequently. Respondents indicate that some forest products are harder to find than they used to be and blame it on the increased amount of people in the area (plantation and logging workers who collect forest products), the restrictions for collection in the NP, as well as the reduced jungle area through plantations itself.

Timber is probably the most important forest product for the community, collected and processed by men. It is used for construction and longboat building. Since the introduction of chainsaws, the processing of timber into planks became much easier. The entire longhouse is built with local hardwoods. The locals are allowed to extract a limited amount of timber from the NP area as well as an unlimited amount from other NCL land outside the park. Today timber is also retrieved from the river as logs from the logging activities are floating down the rivers very frequently, which are much easier to collect than transporting trees in the jungle. Wood is not used as a fuel source as gas stoves are available.

3.5 Fishing and fishing techniques

Fishing is the main cash income activity undertaken by the permanent longhouse inhabitants, as can be seen in figure 3.1.3 and places an important role in their every day life as well as their cultural heritage. There are several fish markets in the area and depending on quantity fish is sold in the local camps, Lapok, Marudi or Miri. Fish is generally sold fresh but some is also processed (smoked, salted, crackers, etc.). Fishermen indicated that there is less fish today then there used to be before the first oil palm plantations. However, as the market price for fish has gone up since then they can fetch the same profits as in the olden days. Current

prices range from 5 to 20 RM per kilogramme, depending on species and season. The native species are usually preferred for own consumption and only excess supply is sold to the market.

3.5.1 Fish Species

There are at least 14 native fish species recorded in the area (please refer to Appendix C). The most valuable ones are Mengalan (*Puntioplites waandersi*), Tapah (*Wallago spp*.), and Ikan Padi (*Osteochilus melanopleura*). In 1987 a government scheme introduced four alien species (a total of 15,000 fish) in the Sg. Teru. These include Biawan (*Helostoma temmincikil*), Lampan Jawa (*Barbods gonionotus*), *Toman Channa sp*. and African catfish (*Clarias gariepinus*). The purpose of release was that these species have a shorter breeding cycle and therefore would increase the fish population in the surrounding rivers. However, these species are less preferred by the locals and also fetch lower market prices. Since the introduction in the 80's, respondents indicated that the alien species are dominant over the native species and that the native species became less common and also smaller in size. For example, the native big catfish has not been caught in years. According to the locals, the authorities are not concerned and might not be aware of the effects caused by the new species.

3.5.2 Changes in fishing techniques

Nets and fishing lines with hooks are used all year round with the main purpose to satisfy own demand. The traditional method of poisoning the water with the roots of a certain tree is employed during very low water levels. However, this technique is not regularly used anymore. With these techniques fishermen are able to catch around five kilograms of fish per day.

The peak season for fishing is the dry season, which is usually between April and August and lasts for about four weeks. During that time the traditional *Salambau* technique is employed, which is exclusively used by Berawan communities. As water levels are low, water flows out of the Loagan Bunut (as it is fed from the Teru River and has no other major contributories) and down the Teru River, barges are placed in the middle of the stream with big nets to scoop up fish. It is only possible to do the *Salambau* when water levels are low and stream velocity is high. During that time fishermen live on their barges and fish continuously. The quantity of fish caught with this technique ranges from 20 to 100 kilograms per day. During the dry season many more people are staying in the longhouse (taking holidays from their usual jobs) than over the rest of the year to benefit from the profit that can be achieved in this very short time. This is also the time when fishermen are making the most money, as during the rest of the year fishing is mainly for self-consumption.

Originally the Salambau barges where fixed and not movable, however today they are constructed on floating logs and can be moved around, which increases the movability to favourable sites. The nets are homemade and used to be crafted from liana with over 10 inch meshes, today they are knitted from ordinary fishing line which reduces the mesh size to 5 to 6 inches. Therefore much smaller fish are caught which are used to make *Koropok* (fish

crackers). Key informants indicate that the current Salambau design, in use for decades, is good and that there is no intention to change it. Altogether there are 87 Salambau sites, both from Rh. Kajan and Rh. Meran, located in the Sg. Sit, Sg. Bunut, Sg. Teru and Sg. Lelak. Each household has the right to at least one site and some have up to five. If the household is unable to fish the sites can also be leased out to others. The headman of Rh Kajan, Mr. Kajan Sigeh has the authority over the Salambau sites (*tapak*) and all barges have to be approved by him.

3.5.3 Fishing intensity

Informants indicate that the number of fishermen in Rh Kajan as well as the total hours of fishing has probably gone up. However, they think that the total number of fishermen (from Rh Kajan and other longhouses) and hours spent fishing has gone down, as since the inauguration of the National Park the Berawan communities have the exclusive rights to fish in the area where *Salambau* is mainly employed. Therefore, the NP actually facilitated exclusive rights for the Berawan, which results in more control over the resource to the headman Kajan. This control could potentially lead to a more regulated use of the resource in the future, in order to avoid over fishing (e.g. minimum size of net meshes, fishing intensity, stop fishing in known breeding grounds, etc.)

Fewer fishermen would normally have a positive impact on the quantity of the fish stock, although the Berawans complain about a decrease in the stock of fish. This could stem from over fishing but a more valid explanation is probably the oil palm plantations in the surrounding area, which are potentially polluting the river. Connections between oil palm plantations and river pollution were established by Murtedza et al (n.d.). The Minister for Environment and Public Health has said about the general state of Sarawak's rivers: "The pollution is caused by illegal dumping of wastes, industrial activities, careless exploitation of jungle resources and unsustainable land development projects." Further, the Minister Datuk William Mawan Ikom says: "The decreasing number of fish in our rivers now is one example of what environmental pollution can bring about." (Borneo Post, 2003) The map below shows the majority of oil palm plantations are along the Teru River, which is the main river used for fishing.

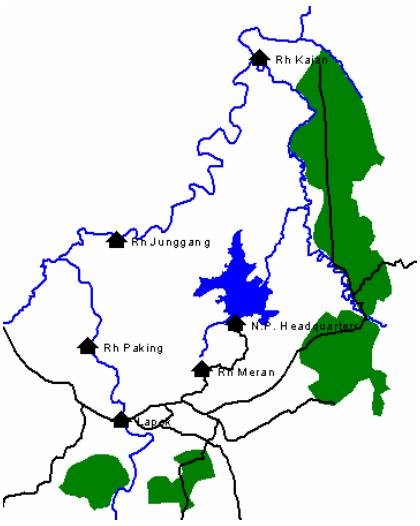


Figure 3.5.3: Extent of Oil Palm Plantations

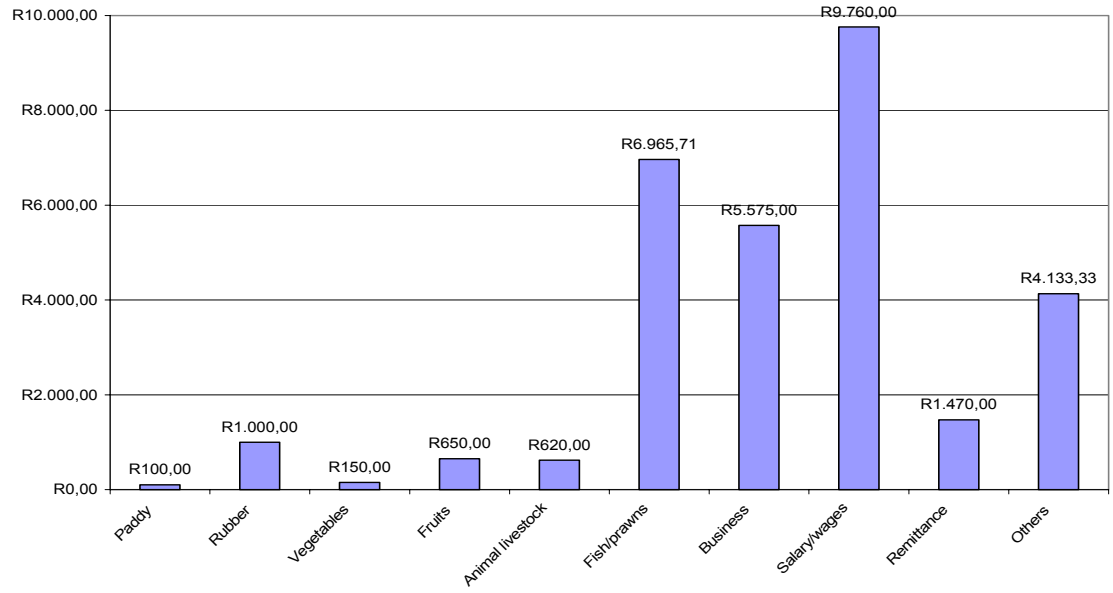
Supporting this argument is a field observation that the Lelak plantation does not meet the requirements in terms of channels to avoid leakage of polluted water to the rivers as specified in the regulations for establishing oil palm plantations. This means that pesticides, fertilizer and sediment will be transferred directly into the Teru Rriver in case of surface runoff and through leakage. This can have direct consequences for all aquatic life in the Teru River and to a lesser degree other rivers downstream.

Overall it is difficult to determine the ecological viability of the Salambau technique, as there are more factors at play. The alien species released by the government in the 1980's as well as the fast development of oil palm plantations have an impact on aquatic life (Murtedza et al, n.d.). In favour of Salambau it can be argued that this technique resembles a once in the year harvesting of fish, that gives the stock time to regenerate over the rest of the year. The fishing pressure in the wet season is relatively small as fishing is mainly for household consumption and the main method employed are fishing lines with small bait fish along the river banks, which only captures fully grown fish.

3.6 Work activities and cash income

Economic activities are mainly carried out by the men, while the women work as housewives, collect forest products and help with farming. However, some of them also operate the fish cracker machine and earn a bit of money on that. The average income of the households was RM 13,219 a year, (see table 3.6.2), which is RM 2,494 per person per year staying in Rh. Kajan. The income mainly derives from salaried jobs, private businesses or fishing. However, the numbers are with some uncertainties, since their income changes due to seasonality and it therefore might be difficult for them to estimate the exact income.

Figure 3.6.1 Income



Another big contributor to the income of the households is money sent from family relatives working outside the area. (See figure 3.6.1).

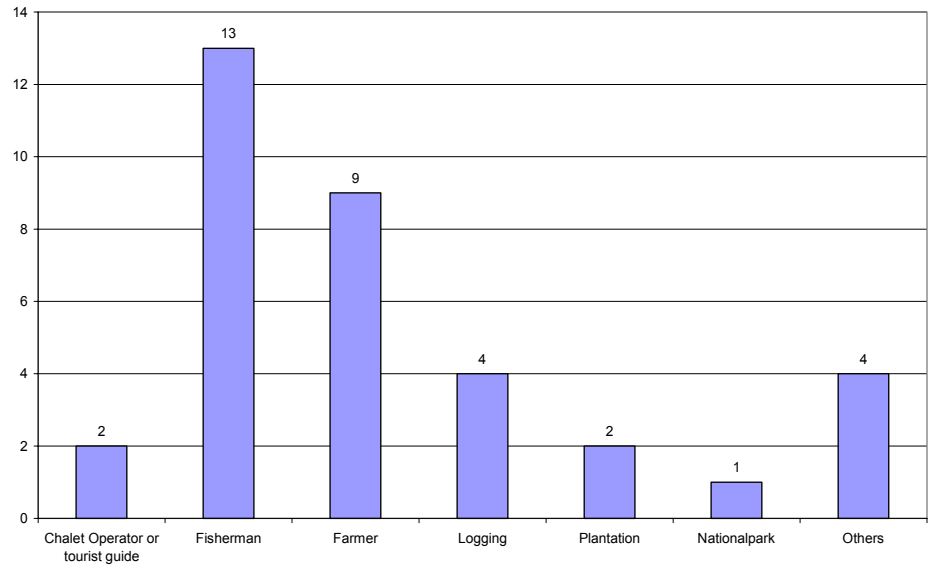
Most of the respondents are engaged in more than one activity (see table 3.6.1), with different sorts of work for subsistence and others for cash income, which points to a diversification of work activities and income sources. The average number of jobs per respondent is 1.75 although the number per household is probably higher, plus activities like collecting forest products and rearing livestock are not included.

Table 3.6.1

X number of occupations		
X	Count	
1	6	32%
2	10	53%
3	3	16%

A few people have their own business (chalet operator, canteen owner, do guided boat trips etc.) and others have salaried work related to the plantation and timber camps (boat driver, lorry driver etc.), the plantation etc.
However, fishing is the main occupation and income for most of the households, 13 of the 19 respondent heads of household were either full or part time fishermen (see figure 3.6.2). Most of the people, who have another occupation, at least go fishing in the dry season, when they can use the Salambau nets, both because of the large amount of fish they can catch, but also as it is part of their tradition. The quantity of their catch has decreased, while the market price has gone up. This makes them able to make about the same living from fishing as they used to.

Figure 3.6.2 Occupation



Farming is another main activity for the Berawan (See figure 3.6.2), though its importance has decreased and is now only for subsistence. At the moment none of the respondents only do farming or make a living on farm products. (See figure 3.6.1). As shown in table 3.6.2 the number of persons in the household staying in Rh. Kajan does not have any affect on whether the household is involved in farming or not. It also shows that the average income for farmers is just a little bit lower than for non-farmers. However, since we were not able to estimate the income from farming products for own consumption (as mentioned in the land use section), the income for farming households are underestimated compared to the ones who have a cash income generating job.
The figure shows that there are a correlation between income and the number of jobs e.g. the more activities people are involved in the more do they earn. Another point to make is that the number of people in the household seems to have a negative influence on the income. This

means that in most cases both the total income per household and the income per person are decreasing the more people there are.

Table 3.6.2 Average income of households

			Number of households members staying in Rh. Kajan									
	no. occ	Data	2	3	4	5	6	7	8	9	N/A	*Total*
No farming	1	Avr. Income	19200		16200			10600			9933	*12633*
		Households	1		1			1			3	*6*
	2	Avr. Income			17700				15750		11880	*15270*
		Households			1				2		1	*4*
No farming Avr. Income			19200		16950			10600	15750		10420	*13688*
No farming Households			1		2			1	2		4	*10*
Farming	2	Avr. Income		14400		10800	8000			15000	13480	*11613*
		Households		1		1	2			1	1	*6*
	3	Avr. Income	7300			12900					24400	*14867*
		Households	1			1					1	*3*
Farming Avr. Income			7300	14400		11850	8000			15000	18940	*12698*
Farming Households			1	1		2	2			1	2	*9*
Total Avr. Income			***13250***	***14400***	***16950***	***11850***	***8000***	***10600***	*15750*	*15000*	*13260*	*13219*
Total Households			***2***	***1***	***2***	***2***	***2***	***1***	*2*	*1*	*6*	*19*

Even though farming does not play a major role in terms of current income, it is generally seen as a safety net for the people of Rh. Kajan in case they get pensioned or cannot find a job that generates a cash income. Therefore, in order to secure their rights to clear the area in the future, most of the people, who have farmland not being cultivated, have planted fruit trees. This shows that the land has a high value to them and in case they loose their rights to it, they would be extremely vulnerable.
The rights to the area seem especially important for the older generation, who has grown up in a time where farming and fishing were the main activities. Even though most of them also have either a salaried job or a private business, it is doubtful that they would move out of the area for a higher salary. To them it seems more important that they can stay at the place of their ancestors and maintain their cultural heritage.

The decrease in farming is probably related to a lack of labour availability, because the younger generation do not want to become farmers. As stated earlier a large proportion of the younger generation has migrated out. For the remaining part it might have to do with the different forms of development in the surrounding area of Rh. Kajan, (e.g. the NP, oil palm plantations, logging and the improved infrastructure), which have increased the possibility of cash income activities. However, most of them stated that it was difficult to find a job in the area close by, and that being the case, the majority would rather follow their friends and move to Marudi, Miri or some other town than take up fulltime farming or fishing.

The majority hopes to find a future job related to the National Park, for example within the tourism sector. However, at the moment the park does not attract many tourists (according to the National Park staff there were only 2405 day-trippers and 732 overnight visitors of which 135 were foreign visitors in 2003). However, since the park only started to receive visitors in October 2002 and is still not fully established in terms of facilities and trails, this might change in the near future, thereby providing some possible benefits for the Berawan. Of course one must be careful that tourism is done in an environmentally sustainable manner, for example by limiting the number of visitors, thus not damaging the ecological environment.

If job opportunities like these do not appear, the future prospects for the longhouse do not look too bright, since the majority of the younger generation then wishes to move out. However, there seems to be a general faith among the Berawan that even though life might get tougher there will always be someone living at Rh. Kajan to maintain their land rights. If the younger generation migrates out, they will not learn the skills and knowledge of farming, fishing etc. and the traditions of the longhouse life will slowly fade away, which will be the end of traditional rural livelihood and probably also their rights to the area, since moving out of a region means the loss of NCL (Hong, 1987: 41).

4. Conclusion

The different forms of land development in the area surrounding Rh Kajan, seem to raise an uncertainty about current, and especially future, access to resources and land among the Berawan people. They feel most insecure about the land outside the NP since they have experienced how oil palm plantation has taken over land, that they have been cultivating and thus feel belong to them. This has made them realize that their control over the land is limited. In the case of the National Park, they would have preferred that it had not been established and that they instead had gotten the rights to the area. However they also acknowledge that the park has brought certain benefits to them in terms of infrastructure, job opportunities and the exclusive rights to fish in the rivers. At the moment they also feel that their rights are better maintained within the park than outside, although they are trying to reduce their dependence on land and other resources within the National Park. This indicates an uncertainty about their stock of natural capital, which seem to have an affect on the livelihood strategy they pursue, as it is a mix between migration and diversification of work activities and sources of income.

The people in the longhouse are involved in a range of different work activities, both for subsistence and cash income, and receive remittance as well, as a part of their income sources. Since a lot of the people are employed in salary jobs next to fishing and farming it indicates that income sources are spread out in order to reduce risks. If diversification had only involved farming and fishing it would most probably have been caused by seasonality instead (e.g. the peak fishing time is the drought season, while farming activities are mostly done just before and right afterwards).

Another strategy pursued is migration. Especially the better educated and younger generation move out, which is probably due to a pull effect from the urban areas as well as limited labour opportunities in the surrounding area of Rh Kajan.

Their livelihood strategy neither involves intensification or extensification of farming, which is probably due to two reasons. Firstly their uncertainty about control over land raises the need to find other ways to maintain their living standard. Secondly the younger generation migrates out, which most likely causes a labour deficiency and certainly less demand for agricultural products for subsistence.

In terms of influence of the longhouse people on the National Park, the effects are thought to be very limited. The agricultural lands inside the park are limited in extent and there is no indication of either intensification or extensification in the near future. Furthermore restrictions are in place to limit the extraction of timber and forest products. In terms of

wildlife no active hunting of endangered species are performed and this without tight control from the National Park staff. There is some evidence that fish stocks are decreasing, but whether this is due to over fishing / modified techniques, due to introduction of new species or due to pollution of the rivers is difficult to assess.

5. References

Ahmed, I and Lipton, M (1997) *Impact of Structural Adjustment on Sustainable Rural Livelihoods: A Review of the Literature* IDS Working Paper 62, IDS Publications Office, UK

Aubrey, S (2004) *Getting more tourists to visit our national parks* in Sarawak Tribune February 7th 2004, Malaysia

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.

Cooke, F. M. (2002). *Vulnerability, Control and Oil Palm in Sarawak: Globalization and a New Era?*. Development and Change. Vol 33(2) 189-211.

Cramb, R. A. and Wills, I. R. (1990) *The role of traditional institutions in rural development: communtyi-based land tenure and government land policy in Sarawak, Malaysia* World Development 18:347-360

Government Gazette (1983) No 1468

Hansen, T. S. and Mertz, O. (2003) *Migration, Off-Farm Labour and Government Policies – three decades of change in shifting cultivation*. Pp 25-54 in Mertz, O., Wadley, R. L. and Christensen, A. E. (eds.) Local Land Use Strategies in a Globalizing World: Shaping Sustainable Social and Natural Environments. Proceedings of the International Conference, August 21-23, 2003. Volume 4. Institute of Geography, University of Copenhagen, Copenhagen

Hong, E. (1987) *Natives of Sarawak* Institut Masyarakat, Kuching, Malaysia

Hussein, K. and Nelson, J. (1998) *Sustainable Livelihoods and Livelihood Diversification* IDS Working Paper 69, IDS Publications Office, UK

Ismail, Z. I. (2004) *RM30b palm oil earnings seen* in New Straits Times. Business Times February 13th 2004, Malaysia

Kedit, M. P. (1989) *Ethnicity in a Multi-Cultural Society: Dayak Ethnicity in the Context of Malaysian Multi-Cultural Society* in The Sarawak Museum Journal, Vol. XL No. 61 (New Series), Special Issue 4, Part I, Kuching, Malaysia

McDowell, C. and de Haan, A. (1997) *Migration and Sustainable Livelihoods: A Critical Review of the Literature* IDS Working Paper 65, IDS Publications Office, UK

Menon, A. and Murtedza, T. (1999) *Water resource management in Sarawak, Malaysia*. Center for Technology Transfer and Consultancy. University Malaysia Sarawak, Kuching

Mertz, O., Nielsen, U., de Neergaard, A., Sehested, M., Noweg, G. T., Jikus, O., Jepsen, M. R., Bruun, T., Saarnak, C. and Magid, J. (2003) *Productivity crisis in shifting cultivation systems? Impacts of fallow, labour, nutrient management and government policies.* Pp 1-23 in Mertz, O., Wedley, R. L. and Christensen, A. E. (eds.) Local Land Use Strategies in a Globalizing World: Shaping Sustainable Social and Natural Environments. Proceedings of the

International Conference, August 21-23, 2003. Volume 2. Institute of Geography, University of Copenhagen, Copenhagen

Mikkelsen, B. (1995) *Methods for Development Work and Reseach. A guideline for Practitioners* Sage Publications India Pvt Ltd, India

Murtedza, T., Oksen, P. and Müller, T. (n.d.) *Land use zones and land use conflicts in the Liwagu-Labuk River basin, Sabah, East Malaysis*
Available at: http://www.tropentag.de/2002/abstracts/links/Muumllller_6ghwn6y9.pdf
Accessed: 250304

Murtedza, M., Sayok, A., Efransjah and Bessaih, N (2003) *Water Resource Management Challenges in a Lacustine Peat Swamp Forest Park – A Case Study of the Loagan Bunut National Park, Sarawak, Malaysia* FRST Tecnical Paper Series No. 2 (1)

Ngidang, D. (2003) *Transformation of the Iban Land Use System in Post Independence Sarawak.* Pp 195-226 in Mertz, O., Wedley, R. L. and Christensen, A. E. (eds.) Local Land Use Strategies in a Globalizing World: Shaping Sustainable Social and Natural Environments. Proceedings of the International Conference, August 21-23, 2003. Volume 1. Institute of Geography, University of Copenhagen, Copenhagen

Sarawak Government Gazette (1991) No. 2789

Scoones, I. (1998) *Sustainable Rural Livelihoods: A Framework for Analysis* IDS Working Paper 72, IDS Publications Office, UK

SLUSE (2003) Preparatory *Missions for SLUSE Field Course, January-February 2004, Loagan Bunut National Park, Tinjar River Catchment*

The Borneo Post (2003) *Sarawak Rivers lose their fish to pollution*. [online] available at: http://www.earthisland.org/borneo/news/articles/030302article.html
Accessed: 171003

UNDP (2000) Project *Document: Conservation And Sustainable Use Of Tropical Peat Swamp Forests and Associated Wetland Ecosystems*
Available at: http://www.gefweb.org/Documents/Project_Proposals_for_Endorsem/PP_Archives/Malaysia_Peat_Swamp.pdf
Accessed: 201203

UNDP (2003) *Conservation and Sustainable Use of Tropical Peat Swamp Forests and Associated Wetland Ecosystems. Annex 7: Project Site Descriptions*
http://www.undp.org.my/event/docs/UNDP_PSF_MDA_site_descriptions.pdf
Accessed: 010404

Appendices

Appendix A

The Department of Environment Interim Water Quality Classification

From Menon, A. and Murtedza, T. (1999) Water Resource Management in Sarawak, Malaysia. Centre for Technology Transfer and Consultancy. University of Malaysia Sarawak

	Classes					
Parameter	**Unit**	**I**	**II**	**III**	**IV**	**V**
NH_3	mg/l	0.1	0.3	0.9	2.7	>2.7
BOD	mg/l	1	3	6	12	>12
COD	mg/l	10	30	60	100	>100
DO	mg/l	7	5-7	3-5	<3	<1
pH		6.5-8.5	6-9	5-9	5-9	-
Elect. Cond.	µS/cm	250	500	-	-	-
Total suspended solids	mg/l	25	50	150	300	>300
Turbidity	NTU	20	100	-	-	-
Hardness	mg/l		250	-	-	-
Cd	mg/l	0.01	0.01	-	-	-
Cu	mg/l	0.03	0.02	-	0.2	-
Fe	mg/l	0.3	1.0	-	-	-
Pb	mg/l	0.02	0.02	5.0	5.0	-
Mn	mg/l	0.1	0.10	0.10	0.20	-
Ni	mg/l	0.05	0.05	0.20	0.20	-
Zn	mg/l	0.4	0.4	2.0	5.0	-
NO_3	mg/l	7.0	7.00	-	-	-
P	mg/l	0.2	0.2	-	-	-
Aldrin/Dieldrin	µg/l	0.00	0.02	0.02	-	-
Lindane	µg/l	0.00	0.4	2.0	-	-
T-DDT	µg/l	0.00	0.1	0.1	-	-
Endosulfan	µg/l	0.00	10.0	10.0	-	-
Heptachlor epoxide	µg/l	0.00	0.05	0.05	-	-
Total coliform	Col/100ml	100	1000	5000	50000	
Faecal coliform	Col/100ml	10	200	500	2000	

Appendix B

Fish species of Rh Kajan

Native species	**Local name**	**Scientific name**
	Baong	*Mytus nemurus*
	Betutu (kedebu)	*Oxyeleotris marmorata*
	Ikan padi	*Osteochilus melanopleura*
	Juak (adong)	*Hampala bimaculata*
	Kacong	*Osteochilus sp.*
	Kaloi	*Osphronemus goramy*
	Keli	*Clarias teijsmanni*
	Mengalan	*Puntioplites waandersi*
	Patin	*Pangasius sp.*
	Sakam	*Mytus wyckii*
	Seluai	*Rasbora caudimaculata*
	Tapah	*Wallago spp.*
	Udang galah	*Macrobrachium rosenbergii*
	Udun (runtu)	*Channa sp.*
Introduced species	Biawan	*Helostoma temminckii*
	Lampan jawa	*Barbodes gonionotus*
	Toman	*Channa sp.*
	Sembilang (Actually African catfish)	*Clarias gariepinus*

Appendix C

Date	Alois	Mads	Marie
Monday 26/1-2004	Arrived at Rh Kajan. Informal conversation with the Longhouse residents in the evening.		
Tuesday 27/1	Danish/Malaysian group discussion about study objectives, methods, questionnaire and the presentation. Interview with the headman.		
Wednesday 28/1	Preparation of the presentation	Correction of the questionnaire and trial run.	
	Presentation of the study objectives and methods. Group discussion and correction of interview guide and questionnaire		
Thursday 29/1	Questionnaire sessions		
Friday 30/1	Questionnaire sessions		
Saturday 31/1	'Fishing trip' to the lake, demonstration of the Salambau method. Key informant interview with a group of fishermen.		
Sunday 1/2	Questionnaire sessions Focus group interview		
Monday 2/2	Hunting trip	Image processing and preparation for ground truth collection	Typing in questionnaire
Tuesday 3/2	Water testing	Questionnaire sessions	Typing in questionnaire

Wednesday 4/2	Interview with the headman of Rh. meran Visit to a farm	Ground truth collection	Interview with the headman of Rh. Meran Visit to a farm
	Key informant interview with group of farmers		
Thursday 5/2	Water test analysis	Interview with the clinic and the school principal	
Friday 6/2	Departure		