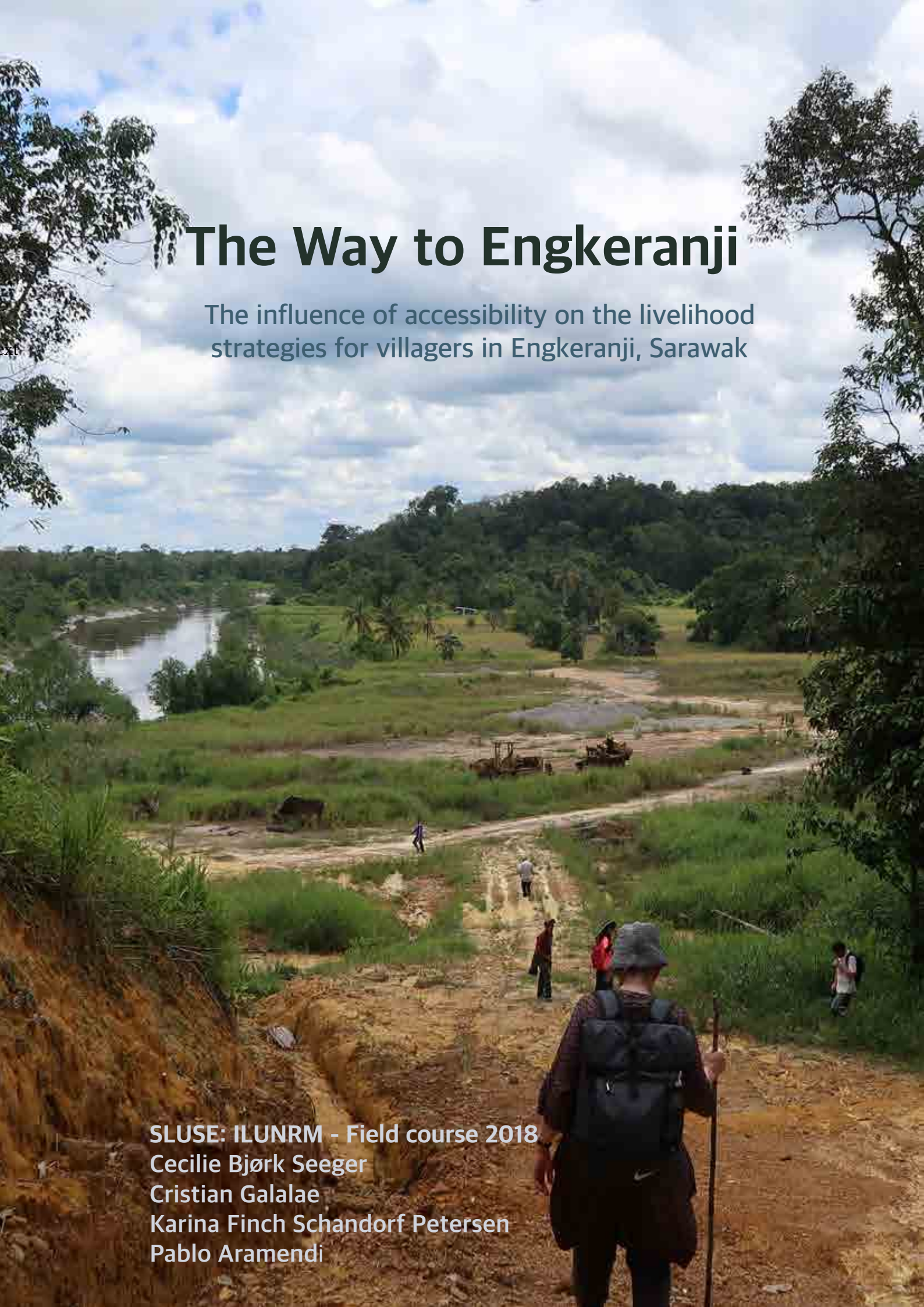


The Way to Engkeranji

The influence of accessibility on the livelihood strategies for villagers in Engkeranji, Sarawak

SLUSE: ILUNRM - Field course 2018
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Colophon

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Abbreviations

C - Carbon

HH - Households

GIS - Geographical Information Systems

GPS - Geographical Positioning System

KU - University of Copenhagen

N - Nitrogen

NP - National park

PRA - Participatory Rural Appraisal

RUC - Roskilde University

SLF - Sustainable Livelihood Framework

SLUSE - Sustainable Land Use and Natural Resource Management

SSI - Semi-Structured Interviews

UNIMAS - University of Malaysia Sarawak

Abstract

This report is based on the field research performed in Engkeranji, a rural community comprised of five sub-villages located in the Malaysian State of Sarawak, Borneo. The report is a product of the Master-level field-course on Interdisciplinary Land Use and Natural Resource Management, and is a corporation between KU and RUC in Denmark and UNIMAS in Malaysia, written by students from KU and RUC. The report aims to give an understanding of the influence of accessibility on the livelihood strategies for the villagers in Engkeranji. During the field trip a broad aspect of methods were performed in collaboration with the local villagers together with students from UNIMAS. The methods conducted comprised of both social science and natural science methods such as GPS mapping, soil sampling, water sampling, observation, participatory rural appraisal, questionnaires, interviews and transect walks.

To get an overview of all the data, the results are described in four topics, which are Accessibility, agriculture, rural-urban migration & mobility and national park. From the results it can be concluded that the deficient accessibility, alongside with other factors such as cash-crops price fluctuation, have constrained the development of the livelihood strategies. This situation, fosters the rural-urban migration of the young villagers, on an attempt of diversifying their livelihood strategies. Simultaneously, the implementation of the Gunung Lesong National Park has created a window of hope in Engkeranji.

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Table of contents

Abbreviations	1
Abstract	2
Acknowledgements	3
Work distribution	6
Introduction	7
The Study Area	8
Objective and Research Questions	10
Objective	10
Research Questions	10
Theoretical Approach	11
Determinants of Rural Livelihood Diversification	11
Ribot and Peluso	11
The Sustainable Livelihood Framework	12
Terminology	13
Accessibility	13
Rural-urban Mobility	13
Methodology	14
Approach to the Study	14
Natural Science Methods	14
GPS Mapping	14
Soil Sampling	14
Water Sampling	15
Social Science Methods	16
Observation	16
Participatory Rural Appraisal	16
Matrix Ranking	16
Focus Groups	17
Participatory Mapping	17
Participatory Observation	18
Seasonal Diagram	18
Questionnaire	19
Semi-structured and Informal Interviews	19
The Transect Walk	19
Collaboration With Counterparts (UNIMAS)	20
Results	21
Accessibility	21
Agriculture	26
Rubber	27
Paddy Rice	29
Pepper	30
Livestock and fishing	33
Market access	35

Rural-urban Migration & Mobility	36
Remittance	37
Educational Opportunities	38
National Park Gunung Lesung	39
Part Conclusion	42
Discussion	43
Results Discussion	43
Villager Perspective on Future Livelihood Changes	43
The Sustainable Livelihood Framework approach	45
Motives of Diversified Rural Livelihood Strategies	46
Seasonality, Risk & Asset Strategies	47
Accessibility as an Asset	48
Multiple Determinants for Diversifying LS	48
Method Discussion	49
Reflections	52
Uncertainties in the data	52
Reflections on the SLF approach	53
Conclusion	54
Reference List	55
 Appendixes	 58
I Methods used during fieldwork	58
II Method descriptions	59
Natural Science Methods	59
Social Science Methods	61
Reference list	70
III Water sampling Results	71
IV Questionnaire	75
V Interview Guideline I	80
VI Interview Guideline - Teachers (with answers)	81
VII Interview Guideline II	82
VIII Seasonal Diagram Results	86
IX Matrix Ranking Results	89
X Participatory Mapping Results	92
XI Synopsis	96

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Introduction

In Sarawak, Malaysia, the government introduced a new economic policy in the 1970's, which aimed to reduce poverty and even out the ethnic socio-economic differences to fight the communist insurgency. Sarawak had for many generations been dependent on export of primary commodities and was growing in labour force as well as having a big potential for growing the eco-tourism industry. The new economic policy meant a modernization where the government tried to improve infrastructure in rural areas, increase the amount of people getting an education, improve the welfare system and create more jobs (Den store danske 2013). Over the next decades the infrastructure improved and accessibility had a big influence on the livelihood strategies in the rural communities. One of the key elements for economic growth in the rural communities in Sarawak is the access to education and jobs (Schatz 2015:175-197). The access to urban areas is poor when a rural community is placed in a remote area without a proper road connection, which can be a big constraint for the development of a rural community. Poor access influences the agricultural market access which have an effect on villagers livelihood strategies. Resource access has also other, more social related aspects, which are not limited to property relations (Ribot & Peluso 2003:153-173).

The latest years of improving accessibility to rural areas in Sarawak has enhanced rural-urban migration and mobility. The younger generation started migrating to urban areas for jobs and education to improve their livelihood (Abdullah 2017:792-793). A financial benefit of the rural-urban migration is sending remittance to support the rural HH's financial security due to multiple sources of income (Hansen 2005:186). Engkeranji is, located by a foothill of a mountain, surrounded by an abundance of natural resources. Lately the establishment of a logging road as well as a NP on the mountain, have opened up towards a potential for further development on the infrastructure in the area to enhance the eco-tourism, as well as the indigenous development.

The Study Area

The focus of this study is the kampung Engkeranji, an Iban settlement located approximately 175 km from Kuching by car (Google maps), in the south-eastern part of Mount Lesong (1°15'9.01"N, 111°11'4.93"E), in the western part of Sarawak, Borneo. The community comprises of five sub-villages (see figure 1a). Each village have their own headman and the total amount of HH's, who are currently living there, are 47.

	Headman (Tuai Rumah)	Households
Kampung Sungai Tarum	TR Wilson	22
Kampung Engkeranji	TR Martin	10
Kampung Kranji Ili	TR Muris	3
	TR Mounsey	11
Kampung Sungai Papan (in construction)	TR Simeon	15 (Kuching), Left 1 HH

Figure 1a shows the different sub-villages, their headman and the amount of households living in the sub-village.

The community has an anglican church and a primary school. The higher part of Mount Lesong was in 2013 established as a NP named Gunung Lesong. Since 2010, the Engkeranji community became more open for access to the market because of the establishment of the logging road, aimed to transport the logs to the log pond in the village surroundings. Since the logging activities stopped in 2015, the road was and still is being used as an access between markets and the Engkeranji community, but the quality of the road has become worse because of erosion. Due to the quality of the road the villagers in Engkeranji use both the road and the river as means of transportation.

The HH's in Engkeranji are diversified through different activities for functioning financially. Many HH's in the community are fishing, having livestock, performing different kinds of agricultural production such as pepper, paddy and rubber. In addition the villagers grow fruit trees, collect natural resources from the forest and some go hunting in the forest.

This report aims to investigate how the accessibility to the area influence the Engkeranji villagers livelihood strategies. Our research will focus on the accessibilities influence on the villagers agricultural practices and rural-urban migration. We will further investigate how the establishment of the NP Gunung Lesong in the future could influence the accessibility to Engkeranji and the villagers livelihood.

Objective and Research Questions

Objective

To study the influence of accessibility on the livelihood strategies for villagers in Engkeranji, Sarawak.

Research Questions

1. What are the benefits and constraints of transportation by road and by river?
 - 1.1 How are the local road and river conditions affecting the village?
2. How has changes in accessibility influenced agricultural practices in Engkeranji?
 - 2.1 How are the villagers livelihood from an agricultural perspective and what changes have there been during their time as farmers?
 - 2.2 What are the changes in the agricultural practices on a community level?
 - 2.3.1 To what extent can the agricultural changes be explained by changes in accessibility?
3. What influence does the accessibility to Engkeranji have on rural-urban migration and mobility?
 - 3.1 How does the access to education influence the rural-urban migration?
 - 3.2 How does the rural-urban migration and mobility affect the villagers livelihood strategies?
4. How could the livelihood strategies in Engkeranji be influenced by the establishment of Gunung Lesong national park?
 - 4.1 What influence could the national park have on the accessibility and the villagers livelihood?

Theoretical Approach

Determinants of Rural Livelihood Diversification

This report will use Ellis (2000) theory of determinants for diverse rural livelihood strategies in low-income developing countries as a theoretical framework to view our results. Ellis defines diversifying strategies as a variety of different income sources and his six determinants for diverse livelihood strategies are: Seasonality, risk, labour markets, credit market failure, asset strategies and coping strategies (Ellis 2000:289,298). Diversification especially became an important strategy when rural HH's started to become more affected by external factors such as urbanization, price fluctuation in cash-crops and natural disasters such as flooding. The rural HH's either have a need to survive or a possibility for accumulation when choosing diversifying livelihood strategies (Abdullah 2017:792; Ellis 2000:289-292).

Theory of Access

The Theory of Access by Ribot and Peluso (2003) defines the concept of access that we are using in this report. Ribot and Peluso define access as: *The 'ability' to derive benefits from things*, broadening up the term from *the 'right' to benefit from things*. It is a way to looking at access as a wider range of social aspects and there can either be constraints or benefits from it, instead of property relations alone. They suggest a method of access analysis to identify the means, relations and processes, their constellation, and how to draw benefits from things (Ribot & Peluso 2003:154-173).

The Sustainable Livelihood Framework

The Sustainable Livelihood Framework is a way of gathering information about the complex livelihood components in the rural village. It seeks to give us a better understanding and overview of the many dimensions and standpoints of a person living in the village. The livelihood framework is affected by a vulnerability context (trends, shocks and seasonality) and is based upon assets, which contains human, natural, social, financial or physical capital. The assets in a village are affected by local policies, institutions and processes, which leads to the livelihood strategies and outcomes of the livelihood (Cundill et al. 2011:72-85).

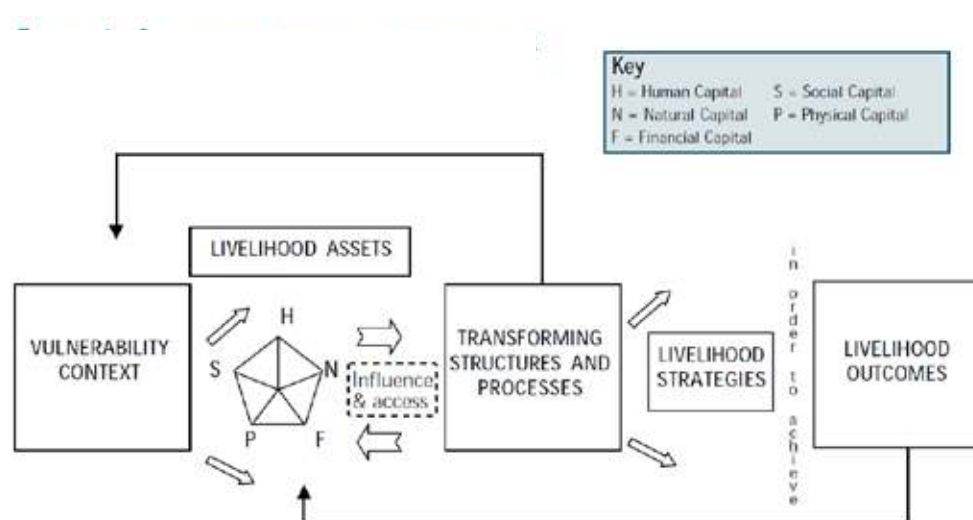


Figure 3 above (DFID 1997): The SLF framework links the contexts with resources or livelihood assets as capitals as an asset pentagon.

By applying the SLF approach, we are able to take a 'snapshot' of assets, resources and strategies, but it also opens up an opportunity to debate definitions, relationships and tradeoffs linked to a broader perspective on some of the political and social aspects affecting the livelihood strategies in Engkeranji (Scoones 2015:34-44).

Terminology

Accessibility

Access is about all possible means by which a person is able to benefit from things (Ribot & Peluso 2003:154-173). The accessibility between the rural and/or rural-urban areas has an influence on a community's development in many terms. Good access to different services and facilities like education, health services etc. means power in the community. Accessibility opens the opportunities for livelihood changes and development (Widle & Cramb 1997:37-53).

Rural-urban Mobility

Rural-urban migration refers to human migration patterns that began in the preindustrial period and continues nowadays (International Encyclopedia of the Social Sciences 2008). Studies argue that the structural transformation, which has been going on for the last few decades in Sarawak, is affected by the increasing rural-urban mobility, when the establishment of roads allowed people to move around easier (Schatz 2015:175-191).

Methodology

Approach to the Study

The research project was conducted in Engkeranji within 12 days and have been interdisciplinary, where both natural- and social science methods have been used, in order to get a broader understanding of how the accessibility influence the Engkeranji villagers livelihood strategies. The different methods have created data in different ways, which is why the following section will describe what methods we have applied in the fieldwork and how they have been applied (see appendix II for reading the method descriptions).

Natural Science Methods

GIS and GPS Mapping

Three different maps were produced prior to the fieldwork showing Engkeranji, neighbouring villages and the surroundings. GIS is a method which can be used to obtain local knowledge on the area and its natural resources (Mikkelsen 2005:90) Since the maps were from 2005, it turned out that many changes had been made in the village such as an increased amount of buildings. For mapping the soil and water sampling as well as the transect walks, we used a GPS to track the paths and waypoints to where we walked. We also used the GPS to track the road from Pantu to Engkeranji, the riverpath from Engkeranji to Pantu as well as a riverpath we went on to Banting

Soil Sampling

In order to understand the agricultural investment in applying fertiliser on the cultivated pepper field, we decided to take soil samples to find the physicochemical properties of the soil. Samples had been taken from headman Wilson's pepper plantation which was 4 years old and had 700 plants on the plot. The samples from the pepper field had been compared with soil samples from the secondary forest near the pepper plot. The comparison with the forest soil, had been done in order to understand the differences between the soil properties and to understand if the farmers need to keep on investing in fertilizer for their pepper. The number of samples were influenced by the plot size (Carter & Gregorich 2008:26-30) and therefore we decided to take 3 replicates each, from the pepper field and forest. The physical properties were done on the base camp and the chemical analysis in a lab in Copenhagen.

Water Sampling

The water sampling was performed in two different stations. Station 1 was situated in the main river (Batang Strap) and station 2 was situated on a tributary stream close to Engkeranji village. There were no boats available on the day that we scheduled the water sampling and therefore it limited us to sample on spots that were reachable from land.

A few parameters were measured on the sampling point (i.e. temperature, pressure, dissolved oxygen, etc.), and others were measured with equipment in the basecamp (i.e. chemical demand of oxygen, nitrates, etc.) and a few were measured by a UNIMAS professor in laboratory facilities (total suspended solids and biological oxygen demand). After that, all the required parameters were measured and the water quality index was calculated according to the national water quality standards of Malaysia (DOE 2007:72).



Picture 1: From one of our transect walks where we used the map when talking to the villagers about the village.

Social Science Methods

Observation

Observation was used to collect basic informations on the villagers livelihood and the infrastructure in Engkeranji. Observation was a method used to observe villagers daily life, physical- and social structures (Mikkelsen 2005:88). During the fieldwork, multiple formal and informal walks to different locations around the village were made to get familiar with the villagers.

Participatory Rural Appraisal

Matrix Ranking

The matrix ranking was used as a method for getting data on the agricultural crops they grow and to understand the constraints and benefit for each crop, by asking the participants to rank them (Mikkelsen 2005:100). The method was done three times and we got their rankings on fertilizer price, vulnerability and management of diseases and pest, labour price, price for the cash crop and preferable transportation for transporting the crops.



Picture 2: Shows the proces of making the data matrix on agricultural practices with a group of women.

Focus Groups

Focus group had the purpose of making the participants discuss their opinions and feelings on specific topics (Bernard 2011:172). We decided to have two main topics for the focus group discussion: Accessibility and natural resources. Resource mapping was done during the focus group, to find out which kind of resources they take from the forest and how far they are willing to go up the mountain for getting the resources. The focus group also gave data on villagers use of the road and the river and their different opinions on the benefits and constraints that the establishment of the NP in the future could create for them.



Picture 3 shows the proces in making the resource mapping while talking and listening to the villagers.

Participatory Mapping

The participatory mapping was useful to understand the boundaries between the different sub-villages within Engkeranji. Each of the groups drew a map with the HH's and the crops within their village. It was a useful exercise in order to learn where each of the HH's are placed and who their headman is (Mikkelsen 2005:90).



Picture 4 above: In proces of making the participatory mapping session. One of the headmen is elaborating details on the sub-villages.

Participatory Observation

During our stay in Engkerangi we took part in different daily activities with the villagers. The aim of this method was to establishing report and learning more about the activities while actively participating in them (Bundgaard 2010 [2003]:56). The fact that we were taking part in the activities and not just interviewing people changed the way that people interacted with us and sometimes their answers were different, which gave us some interesting results.

Seasonal Diagram

Seasonal diagram was used as a method to understand the villagers activities and income level throughout the year. The method created a lot of knowledge on how and when they grow and maintain the different crops, when some of the villagers increase their income by going fish-ing and when the young villagers go to town to get a seasonal job for getting an extra income. The seasonal diagram was used to get an un-derstanding of the different activities and change in income throughout each month of the year (Mikkelsen 2005:96).

Questionnaire

The questionnaire was used as a quantitative method in order to collect a broad amount of data within a short time period. We decided to use the questionnaire on the five sub-villages and collected a total of 60% respondents, being 28 out of 47 HH's. Originally we had planned that the questionnaire should be general and explorative and used in the beginning of the fieldwork. However, when being in the field we quickly found out that our questions were not relevant to the reality we met. Therefore we decided that the purpose of the questionnaire instead should be to get specific knowledge, which ended up being about the villagers agricultural practices and other activities, accessibility, natural resources, rural-urban migration and the future benefits and constraints of the NP (see appendix IV).

Semi-structured and Informal Interviews

We did 17 SSI and many informal interview during the fieldwork. The first couple of SSI were conducted with a guideline having the purpose of being explorative on many different topics (see appendix V). After having analysed the data from the questionnaire, we started to do more in-depth SSI on specific topics (See appendix VI and VII) and some people were specifically chosen for a SSI due to their answers in the questionnaire. The questions in the SSI consisted of open-ended questions, which made it possible to ask additional follow-up questions to highlight relevant issues (Mikkelsen 2005:89).

The Transect Walk

The transect walk was an approach which enabled us to gather data on the study site, by having a general overview of the site (Lorenzo 2014:1). The transect walks have been conducted with local guides. During the first two days we did two transect walks. One was done in the surrounding area outside of Engkeranji and one within the five sub-villages. Through these walks we observed the area, the resources used by the villagers, different practices taken place and asked the guides questions about what we saw.

Collaboration With Counterparts (UNIMAS)

During the fieldwork we had a close collaboration with the counterparts from UNIMAS. However, since we had to write this report without their attendance, we ensured that every time we split in different working groups, at least one of us from Denmark was represented. Therefore, and due to the data exchange, we experienced with our collaborators both during the fieldwork and after we got back, that we have ensured to collect all the data from the field research. After the fieldwork when analysing the data we have experienced uncertainties in understanding the data and because of our good collaboration, we have been able to get help from our counterparts and interpreters.



Picture 5 above: Taken during our first transect walk. Many observations were made in the area.

Results

Triangulation have been used to analyse the data in order to see how the different interdisciplinary methods created knowledge on the same issue but got different kinds of data.

The results we have collected from our fieldwork have been divided into four different topics: Accessibility, agriculture, rural-urban migration & mobility and the national park Gunung Lesong. The seperated topics were made to make a better understanding of how the different factors all were affecting the accessibilities influence on the villagers livelihood strategies. The four sections were all connected and their linkage will be described in the end of this chapter.

Accessibility

The way to Engkeranji were either by road or by boat. Before the road was established in 2010, the only way people could get to the village was by boat from Lingga downstream or Pantu upstream. Our research showed that access had improved due to the establishment of the road from Pantu to Engkeranji in 2010. The road was made of gravel and there were many big stones and holes in the road. Villagers also said in the interviews that there had been an increased amount of crocodiles in the river recently and that there was a link between flooding in the river and crocodiles being an issue. The villagers experienced it as a problem affecting their access to the river and where they would once swim in the river, they were now more careful.

	Road from Pantu to Engkeranji	River from Engkeranji to Pantu (upstream)
Distance	24.3 km	26 km
Duration	4 hours and 4 min (with a 12 min stop)	1 hour and 11 min
Elevation	Min: 6 m, max: 77 m	10 m

Figure 4: GPS results from our two means of transportation, car and boat, getting to and from Engkeranji. We have made some mistakes when saving the GPS data so all the tracks were saved together as a single file. We managed to isolate the data that was useful for us, but we are not absolutely sure of its veracity, since some of the data stored together with this one got corrupted (It was placed in some locations that did not make any sense). An example of this veracity was the duration of the trip by car from Pantu to Engkeranji. We know that the trip was around two hours long but the GPS said 4h 4 min...



Through interviews we got the price for a return trip to Pantu, being RM70 by boat and RM30 by car. It was cheapest driving but the cost of buying a car was also a lot higher. In figure 6 below it is seen how only 3 villagers out of 28 own cars compared to 15 owning a boat with an engine. Through interviews we know that villagers could pay to get a ride from one of the carowners.

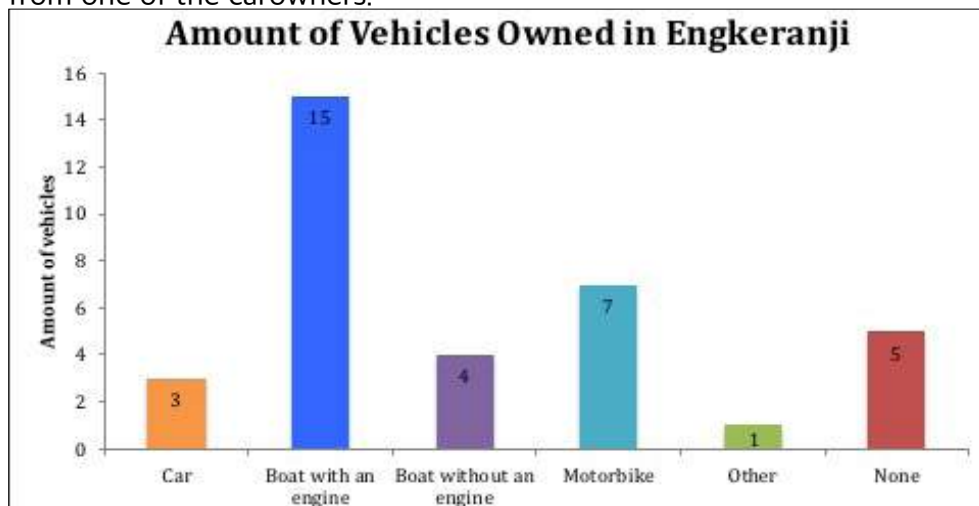


Figure 6 above: shows the amount of vehicles being owned in Engkeranji from the questionnaire of 28 participants.

Headman Martin points out in an interview that:

The road is more convenient to use for transporting things because there can be twice as much in a car than on the boats. The car can also get closer to the house compared to the boat.

From other interviews we had data saying that boat was preferred because it can get closer to their house and therefore it was easier to transport things. Our data have been contradicting concerning preferred transportation, but when triangulating our data from the participatory mapping, matrix ranking and interviews, then we could see that there was a tendency showing that the villagers living closest to the road would prefer using car and villagers living closest to a stream would prefer using boat. The data from participatory mapping (See appendix II) were used to see where the water streams and roads were located and by comparing that to the villagers preferred transportation from interviews and matrix ranking (See appendix II) we got this result. According to the theory of access by Ribot and Peluso, the property relation to access has some power, but there are a 'bundle of powers' relating access and the social and political-economic aspects also have a lot of power (Ribot & Peluso 2003:154-173).

Figure 5 opposite page: Shows a map with the GPS tracks by road from Pantu to Engkeranji, and by river back to Pantu after we finished the fieldwork. There was a failure in the GPS for the first stretch of the GPS riverpath, which can be seen on the path by a straight line.



Picture 6 above. A photo taken on the 2nd of March showing how the erosion have ruined the bridge.

In several interviews villagers said that there was little maintainance of the road When arriving to the field we observed how the bridge leading from Engkeranji to Semolung Ulu were ruined due to heavy erosion.

Four days after we observed how the road had been repaired and we were told that the logging company had repaired it because they were coming back. In interviews it was said that the road was dangerous to use after heavy rain due to erosion and in those periods the river was used.



Facilities

The primary water source for Engkeranji was from a spring in Senyandang, the South-eastern part of Mount Lesong. The water was normally boiled for drinking. Our water results show that it is class I (see appendix III) and used for all HH purposes. Most of the villages went bathing directly in the river or by using a bucket at home. Lack of healthcare was a general problem in rural areas of Sarawak and Engkeranji is no exception.

The lack of stabil electricity, meant that we during our stay had a generator going for a couple of hours every day in the community hall, which were where we stayed during our visit. The school had a generator going 24 hours a day and a few other HH's also had generators turned on occasionally. A government project from 2008 ensured small solar panels in every HH in the sub-village Sungai Turum. Informal conversations revealed that most HH's were given enough energy by the solar panels to get along with enough electricity most days. Power cables had been installed alongside the road from Pantu to Engkeranji, so a stabile power supply was expected for the sub-village Sungai Turum within the nearby future.

Performing SSI we found out that the nearest clinic was in Pantu and could be reached either by road or river and the closest hospital was in Kuching. An interview revealed that pregnant women go and live nearby the hospital for the last week before the due date to ensure safety and medical assistance. An interview with teachers from the school in Engkeranji showed that the teachers would often bring children back to the city to visit the clinique if the children were sick or injured. They also explained that they would bring medicine from the clinic to the villagers, when going back to the city for the weekends.

Figure 7 above: Overview of the main facilities in Engkeranji such as water ressources, health care and electricity, all factors having an effect on the accessibility.

The infrastructure is worse when a rural community is placed in a remote area, which is a big constraint for developing the rural communities. A lack of infrastructure influences the agricultural production, employment and household income (Widle & Cramb 1997: 37-53). This substantiate the lack of infrastructure we saw in Engkeranji, which was placed in a very remote area. Figure 7 describes the lack of infrastructure by explaining the facilities in Engkeranji.

The next section will look at how the the lack of accessibility influences the villagers agricultural production.

Picture 7 on opposite page, bottom. Taken on the 4th of March, showing the bridge after repairing.

Agriculture

In our research we found through interviews, that an important part of the Engkeranji villagers source of income came from farming activities. Our results from interviews, participatory mapping and questionnaire showed that many farmers cultivated different kinds of crops, but also that they did other activities. In the participatory mapping from headman Muris' village this diverse amount of activities can be seen (see Appendix II).



Picture 7 - Participatory mapping done by headman Muris' son and grandson showing their sub-village which consists of two households. They drew the placement of their crops, fruits, livestock and fishponds. Despite that they drew the pathways, streams and abandoned HH's which were close to their HH.

In picture 7 it can be seen that the two HH's had 3 kinds of crops: Pepper, rubber and paddy. They also had 3 kinds of fruit trees and different kinds of livestock and fish. Results from the questionnaire substantiates that villagers do multiple activities.

Villagers activities

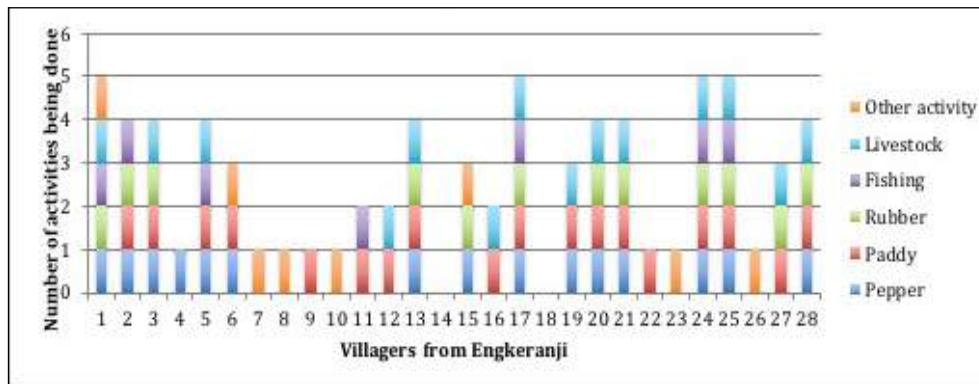


Figure 8 - Activities being done by villagers from Engkeranji.

Figure 8 shows how 15 out of 28 villagers do 3-5 activities. From interviews we know that older villagers often have one or no activities and that they often decreased the size of their cultivated land, due to lack of labour force from younger household members.

The following chapters will presents our results of the Engkernaji villagers main activities.

Rubber

In interviews we were told that rubber used to be their main cash-crop but due to a low market price on rubber (RM3 per kilo), they have not sold rubber for years. When conducting the seasonal diagram with the villagers from headman Mounsey (See appendix II), we were told that they did not fertilize the rubber trees but that they weed it during the whole year in order to maintain it. Rubber could be a potential extra income source for them if the market price increased which can be the reason for why they were maintaining it. In an interview with Hamdan, which can be read in figure 9 we got data on the accessibility changes and its influence on agriculture and rural-urban migration.

Hamdan's story (Interview)

Hamdan is 80 years old and is a ingenious who grew up in Engkeranji. He told us that when he was a child there was no water system or electricity in Engkeranji yet. The villagers did not grow as many crops as they do today and their agricultural practices was mainly for self-consumption. Back then the main cash-crop was rubber and they got RM0,25 per kati (0.5 kg). They didn't have a middleman as they do today. When they wanted to sell the rubber, they went paddling in a boat to Lingga. It would take half a day and they would come back the same day. It was very hard work paddling to Lingga, so the villagers would go and sell their rubber once every third month. They would own the boat themselves and because it was without engine the transportation was free.

Hamdan has never been a farmer himself because he migrated to Sri Aman when he was young to find work. In Sri Aman he worked in a shop for a Chinese middleman. He got married and had children in Sri Aman and with them he moved to Betong. In Betong he did the same kind of work as in Sri Aman. Not many people migrated away from Engkeranji and went to bigger towns to work, as he did back then. Most people would stay in Engkeranji and work as farmers. The reason for him to migrate was because he needed an income. He did not go back and help his family with farming or send remittance, because he earned very little. He only had enough for himself. According to Hamdan people started migrating to urban areas when the road from Pantu to Kuching was established. People would paddle to Pantu and from there use the road.

Before the establishment of the road from Kuching to Pantu there was a ship in Lingga from where they would sail to Kuching. The trip would cost RM7, which was a lot of money back then. In order to be able to afford the boat trip, they would sell the rubber in Lingga and then sail to Kuching and live there permanently. Even after the establishment of the road from Kuching to Pantu the ship from Lingga to Kuching continued to sail.

Hamdan did not believe that the establishment of the road from Pantu to Engkeranji had caused any major changes to the livelihoods in the village.

Hamdan is divorced and does not see his children because they left with his ex-wife. Once he retired he decided to move back to Engkeranji. Hamdan is almost blind and is not able to walk anymore so the neighbours help him. One of the neighbours who help him is his ex-brother-in-law who is Indonesian. He built him his house and he is very dependent on him. The other neighbour who helps him does it by giving him meals.

Figure 9 was an interview with Hamdan who was 80 years old. The interview was the only thing giving us data on how rubber used to be the main cash-crop and it described the accessibility, agricultural and rural-urban migration changes there had happened in Engkeranji by comparing what he remembered from his childhood and how it is in Engkeranji today. The interview gave a general idea of what the Engkeranji villager's livelihood were like around 60-70 years ago.

Paddy Rice

Results from the questionnaire showed that the purpose of paddy was mainly for self-consumption. The paddy cultivation is the most important activity in the Iban population due to the food security and the small extra income which can help them buy the basic needs (Echoh 2017:174-175). Echoh's statement is similar to our results being that paddy was an important crop, because it was their main source of food and gave them a food security.

From interviews and participatory observation we were told that they used to sell more paddy because a middleman used to come by boat and buy paddy from them. The middleman stopped coming 5-6 years ago. By observation and interviews we know that the establishment of the road had made a new middleman come by using the road where he sells groceries and buy cash-crops. This middleman started coming 10 years ago and came to Engkeranji once a week. Multiply villagers said that the current middleman only bought pepper and therefore the paddy was mainly for self-consumption or they would sell it if there was a demand from neighbouring villagers or guests. When interviewing the current middleman we got contradicting data when he said:

Yes, I buy rice from the villagers especially when it is harvest season.

From interviews it seemed like there had been a change for many of the villagers agricultural practice, where they today focused more on selling pepper than rice. Sim (2011) described how a study in Sarawak showed that paddy in the 70's was an important cash-crop due to the villagers sold it to logging camps in the surrounding area. In the 90's the rice production declined and got replaced by pepper and collecting forest products, because it had a better surplus than rice (Sim 2011:597-598). The timeline which the study presents does not fit with our results, but despite that a villager did point out that the guest they sold rice to, could up until two years ago, have been the workers from the logging company. Due to the fact that the logging company closed two years ago, then it makes sense that some farmers in Engkeranji first started cultivating pepper 1-2 years ago.

The Engkeranji villagers cultivation of pepper will be elaborated in the following section.

Pepper

Through the questionnaire our results showed that the Engkenraji villagers main cash-crop were pepper (*Piper nigrum* L.). Results from figure 11 showed that a 100% of the villagers who cultivated pepper also sold it, whereas only 66% of villagers who cultivated paddy sold it.

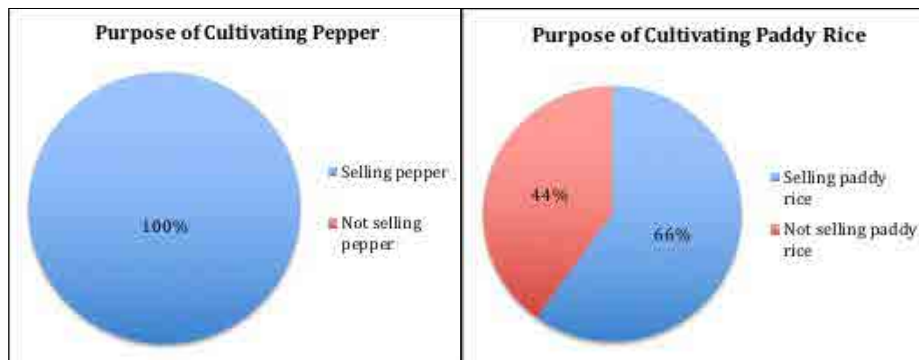


Figure 11: Amount of villagers who sell their cultivated pepper and paddy rice in percentage.

In interviews many villagers said that they within the last couple of years had started to cultivate pepper because the market price was high until this year and the price was in general more stable compared to other cash-crops. Another important reason was that the current middleman started coming and bought their pepper.

From interviews we got data on villagers selling their cash-crops in different ways. Some went to Pantu where others sold it to the middleman who came to Engkenraji. Headman Wilson told us in an interview that:

I sell my pepper production to the Pantu bazaar because the price is RM11 per kg and the middleman pay between RM7-9 per kg.

Wilson's statement on the middleman's price was contradicting to our observation from when the middleman bought pepper from a villager and paid RM10 per kilogram. In interviews from villagers it was said that because the price difference was only RM1, then it was cheaper selling the pepper to the middleman, than paying the cost of transporting it to Pantu. In a different informal interview with Wilson he also stated that he only sold his cash-crops in Pantu if he was already planning on going there, which would not count as extra transportation cost.

Criteria/crops	Black Pepper	Rubber	Rice
Fertiliser Price	● ● ● ● ●	●	● ●
Vulnerability to disease & pest	● ● ●	●	● ● ● ●
Pest & disease management	● ● ● ● ●	●	● ● ●
Labour price	● ●	●	● ● ● ●
Transport by road			
Transport by river	● ● ● ● ●	● ● ● ●	● ● ● ●
Surplus price	● ● ● ● ●	●	● ● ●

Figure 13: Shows the matrix ranking results from headman Muris's village. Through the use of this matrix ranking (see and appendix II) we found that fertilizer for pepper is very expensive, by all three sessions ranking pepper the highest score (5 dots).

From the matrix ranking and interviews we got information on, how the villagers due to the high cost of pepper fertilizer (RM250 per 50 kg), cannot afford to only use pepper fertilizer. They mixed 100 kg of the paddy fertilizer, which they got subsidized, with the pepper fertilizer.

Pepper fields requires before and after harvest season high cost to maintain the plantation and minimize the damages of pepper vines to keep the quality and quantity of pepper berries high (Rosli 2013:18). When doing the seasonal diagram we got data on what Rosli described, by seeing that they fertilized the pepper three times a year (See appendix II- Seasonal diagram by Headman Muris' village).

To be able to understand the changes in the soil properties and the role of the investment in improving the soil fertility, we have done soil samples to see the soil physical and chemical properties. We have compared the soil samples from the pepper field, with soil there was 30 years old from the secondary forest located near the plantation. The results showed (See figure 14) that the soil from the pepper field was less acid (pH value at 4.08) compared to the soil from the secondary forest (pH value at 3.75).

Physicochemical properties/field	Pepper field (<5 yrs)	Secondary forest (>30yrs)
pH	4.08	3.73
Texture	Clay loam	Loam
Density	1.62	1.32
Nitrogen	0.25 % (250,5kg/ha)	0.33% (330,66kg/ha)
Carbon	1.79 %	2.27 %

Figure 14 - Soil sample results

The soil results showed that the soil fertility was poor and the nitrogen content was only 0.25% in the pepper field compared to the forest soil with 0.33%. The C content was 1.79% in the pepper field compared to 2.27% in the forest.

In the tropics the soil can in general be inherently poor and less productive than in the temperate zones (Nair 1993:262), which is consistent to our soil results there showed that the soil fertility was poor. From the soil results we see the importance of investing in fertilizer, since it contributes to increasing the pepper production.

Livestock and Fishing

Other food sources than crops were livestock and fishing, which for some villagers also were income generating. Figure 8, p26 (activities being done by HH's), which have been presented in earlier paragraphs, showed that 14 out of 28 participants in the questionnaire had livestock, whereas 7 of them went fishing. Having livestock and going fishing were mainly for self-consumption as can be seen in figure 15 below.

Purpose on Having Livestock and Fishing

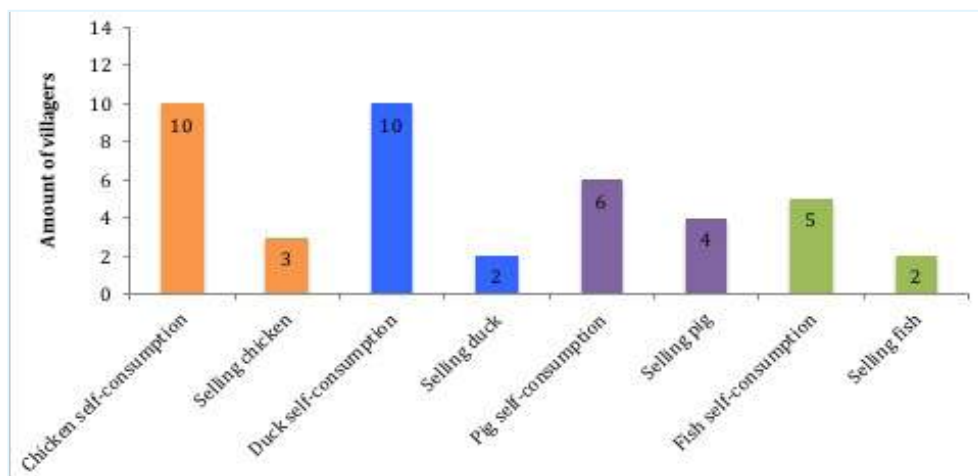


Figure 15 above: The the amount of villagers who had livestock or went fishing for self-consumption or for the purpose of selling.

Figure 15 shows that 10 villagers had chicken and 10 had ducks whereas only 6 villagers had pigs. From interviews we know that pigs were more expensive to feed and therefore many villagers could not afford to have them, but selling a pig would also generate more money than chickens and ducks. Through interviews we found that the villagers who sold their livestock, mainly did it to villagers living in the area.

2 out of the 7 villagers who went fishing, would sell their fish. By comparing to our data from a seasonal diagram and the transect walk, then the questionnaire result on there only being 2 out of 7 villagers, out of 28 respondents, selling their fish seems too low.

In the seasonal diagram done by Wilson (see appendix II) there was a focus on fishing and the possible income it generated. It had been written that some villagers were fishing from February-May and that those who sold their fish would have an increased income. During the first transect walk the guide told us, that many fishermens would sell their fish to the chinese shop.

The amount of villagers selling fish were insecure with our data, but those who sold fish had an extra income. We decided to make a water sample to see if the water quality could have an influence on the fish population.

Water Classes And Uses

CLASS	USES
Class I	Conservation of natural environment. Water supply I – Practically no treatment necessary. Fishery I – very sensitive aquatic species.
Class IIA	Water Supply II – Conventional treatment. Fishery II – Sensitive aquatic species.
Class IIB	Recreational use body contact.
Class III	Water Supply II – Extensive treatment required. Fishery III – Common of economic value and tolerant species; livestock drinking.
Class IV	Irrigation
Class V	None of the above

Figure 16 above: Water classes and uses regarding the Water Quality Index of Malaysia (DOE 2007:72).

The results on the water quality from the big river Batang Strap (See appendix III) showed that the water was polluted and the river belong in class III, according to the National Water Quality Standards For Malaysia (See figure xx). Class III means that the fish population is affected by the water quality and that only the tolerant species can be found in the river.

Market access

Soseco argues that improved access brings savings in transportation cost, time and leads to higher exploitation of potential resources which create higher income in the community (Soseco 2016:132). This exploitation of potential resources was brought up in an interview with headman Martin:

Because the road is bad I do not want to plant more cash-crops. It is too difficult to transport the crops in order to sell it. If the road becomes better I want to grow oil palm and ask my sons to come home and work here. Then I would like to expand the production.

Data from other interviews also pointed towards how some villagers planed on increasing the size of their cultivated land and might even shift to oil palm plantations if the market access improves. Accessibility also influenced the rural-urban migration and mobility, which will be elaborated in the following section.



Picture 8 above: The middleman and his wife selling and trading groceries and goods with the villagers.

Rural-Urban Migration & Mobility

Questionnaires performed showed that 23 out of 28 HH's (see figure 17) had at least one or more HH members who had left the village for job or educational opportunities in bigger cities, such as Kuching and Sri Aman.

Number of Household members working or studying in the city

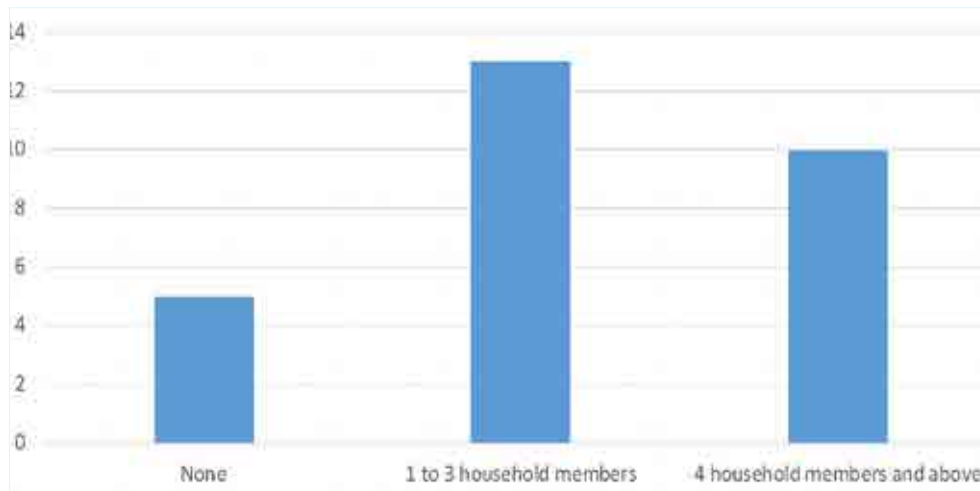


Figure 17 above: Shows the questionnaire results of how many members in the HH's that are working or studying in bigger cities like for example Kuching or Sri Aman.

In depth interviews also revealed that the young people who stayed behind, or moved back later on, primarily did so to care for the elder members of the HH and to continue their heritage. A few young women were married and lived in the village with their small children, while their husband was working in the city, sending remittance to the HH. There had also been cases of prior village residents, who had been living and working outside the village for many years, but then had retired in the village, where they wished to live their retirement year, such as Hamdan. Schatz's research (2015) shows that there during the last 50 years have happened a social change in Sarawak, being that an increased amount the younger members of the HH migrate to urban areas for finding off-farm jobs or continuing education (Schatz 2015:191-192), which is the same as our results from interviews have shown.

Remittance

Remittance play a big role in the rural-urban migration pattern and the livelihood of the people living in a rural area like Engkeranji. The questionnaire revealed that 22 of 28 HH's received some kind of remittance (See figure 18), typically as either money, goods or assistance from HH members living outside the village.

Villagers Reveiving Remmittance

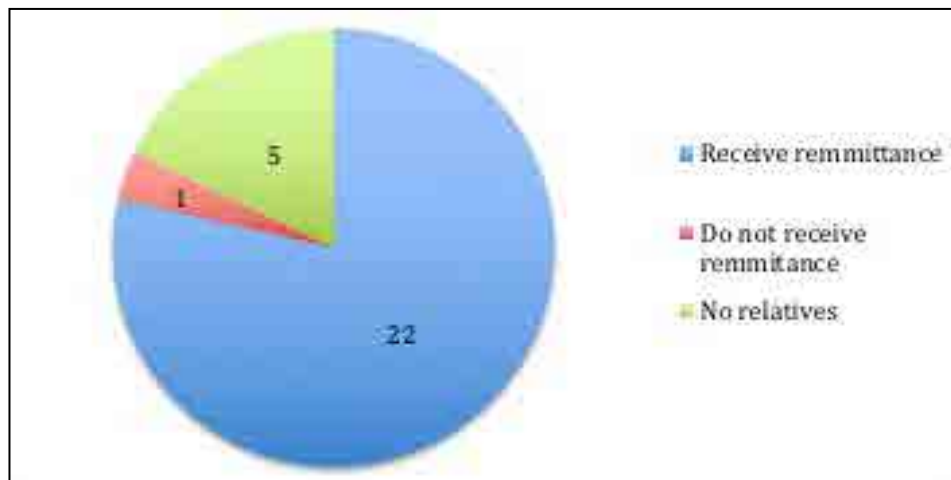


Figure 18 shows the amount of villagers receiving remittance from HH members, out of a questionnaire performed in 28 HH's. 1 HH did not receive remittance from their HH members, 5 HH's did not receiving any remittance and did not have relatives working outside the village, while 22 HH's received remittance.

The interviews also showed that the HH member would typically come to visit the village in holidays and bring goods. Observation and few interviews showed that some villagers also would come to help in the harvest season. It still seemed on the interviewed as if the visit would most often be more of a social visit, than associated with assistance in the field or HH.

In interviews we mainly had data saying that the HH members living in an urban area, would come 1-2 times a year due to the lack of accessibility, which made it too expensive and time consuming for visiting often. In a few interviews, observation and participatory observation we got contradicting data. An example was during a participatory observation where we went harvesting paddy with a woman in the village. While we were harvesting the rice on her fields, she told us that her daughter would come visit and help her by harvesting paddy and help in the HH. She would also come and help, if she for example got sick.

Some villagers said that their young children who lived in cities like Kuching to study or work had higher living cost due to living in a city and therefore they did not expect their children to support them financially. One of the seasonal diagrams showed how young villagers living in Engkeranji from July-September migrated to urban areas for getting a seasonal job, to get an extra income in the HH. Then in September when the labour demand on the paddy field increased the young villagers would come home and help planting the paddy. These young villagers therefore experienced rural-urban mobility. In a seasonal diagram done by another village we were told that they would start receiving remittance in the end of May. When looking at all of the three seasonal diagram's income level throughout the year, their income level was the lowest in June because no one would work during the celebration of the Gawai festival (See appendix II). Therefore it makes sense that the income level in May, through selling cash-crops and receiving remittance, was the highest in order to outway the low-income in June.

Educational Opportunities

The school in Engkeranji was a primary school and offered schooling for the village and nearby villages such as Semolung Ulu, Semolung Ili and Munggu Sawa. An interview with some villagers in the neighbouring village showed that their children go to school in Engkeranji every week-day.

A group interview with three of the teachers in the Engkeranji school revealed that they sometimes would leave their car in Pantu, if they did not have a four-wheel drive. From there on they would have to go by boat to Engkeranji or get a lift with others going to Engkeranji by car. We observed that some of the teachers had four-wheel drives though, but if they did not have one, they would be strongly dependent on others to reach the village. The teachers also explained that the bad internet connection made them work in the weekend when they were in a city, because they there would have internet connection. Sometimes the teachers would help the villagers by bringing them goods and medical supply and even take the children with them to the health clinique whenever necessary. In an informal interview with Headman Wilson, during a boat trip to Banting, he explained that he as a child went to Banting to attend the secondary school there. The teachers explained how most children in the school would attend secondary school and therefore migrate to a boarding school.

National Park Gunung Lesong

The first aspect on the relation between the Engkeranji villagers and the establishment of Gunung Lesong NP, was an observation of a banner hanging in the community hall. The banner was referring to the foundational meeting of the eco-tourism committee of NP. The meeting was held in Engkeranji and headman Wilson was elected as part of the direction board of this committee. Succeeding in having the meeting in one of the hardest accessible communities around Gunung Lesong, was the first sign showing us, that headman Wilson and the village were quite involved in getting under the government's radar. The Chinese shop owner said in an interview that Wilson around once a month goes to Kuching to meet with government officials and, that he requests many things from them in order to develop Engkeranji.



Picture 9 shows the banner from the eco-tourism meeting of the national park Gunung Lesong, which was hanging in the community hall in Engkeranji. The event had taken place a few days prior to our visit.

From interviewing Wilson we learned that there had been conflicts in the past because the boundaries of the NP were too close to Engkeranji, which would limit their daily activities. After some disagreements against the proposed delimitation of the NP, they achieved that the government retracted their original idea and both the government and the villagers reached an agreement on the new boundaries. The government officials and the Engkeranji villagers agreed to create a committee for the promotion of the eco-tourism in the area. Wilson and the villagers' engagement and influence with the government officials on the NP is from the SLF's perspective a strong social asset to have, which improves their social capital (Cundill et al. 2011:79-80).

The Use of Mount Lingga

Our first couple of interviews showed that the villagers use of Mount Lingga mainly were to extract natural resources (Rattan for making matts, hunting, etc.), agriculture and spiritual use. When asking how the establishment of the NP could affect these activities most of them answered that the boundaries of the NP were too high up the mountain for affect them. However headman Muris said that:

Because there are not yet any rangers then we can still go hunting for animals and take resources. When there in the future will be rangers then we will have to ask for permission to go and get it.

In a few other interview similar statements to Muris were heard. When comparing this data from interviews to data from the questionnaire on the same topic, then the results were different. Figure 19 shows that 17 out of 28 does not use Mount Lingga for anything. The mountain was according to the questionnaire mainly used for collecting natural re-sources (7 out of 28). 4 answered that they used it for spiritual purpose and also 4 answered that they were guides for people wanting to use the mountain spiritually.

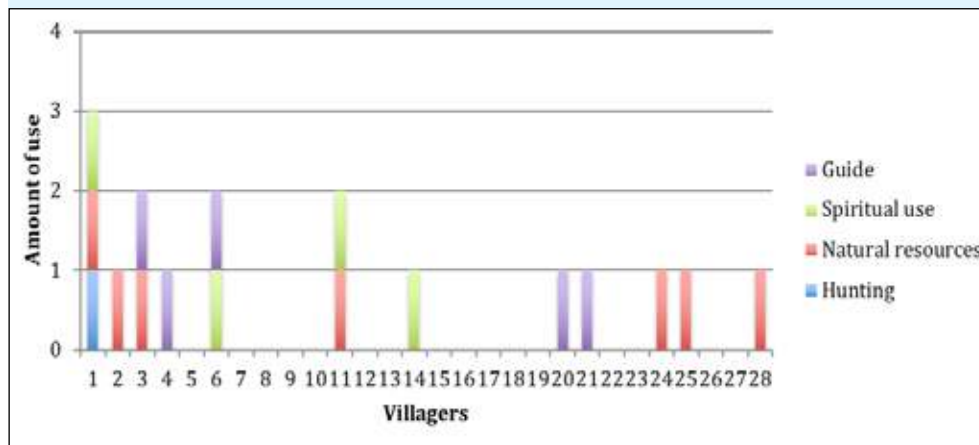


Figure 19 above shows the villagers use of Mount Lingga.

Regarding the expected benefits from the NP, data from interviews and the focus group session had similar results saying that many villagers expect the creation of jobs within the NP (government officials promised them that), an improved road and a increased amount of visitors. It was in the focus group mentioned that they had created a path for eco-tourism in the higher part of the mountain.

The questionnaire results from figure 20 substantiate these results by showing that more than 60% of the participants believed that the road would be improved, more jobs would be created and an increased amount of visitors would come, which would increase their income.

Benefits of the establishment of the National Park Gunung Lesung

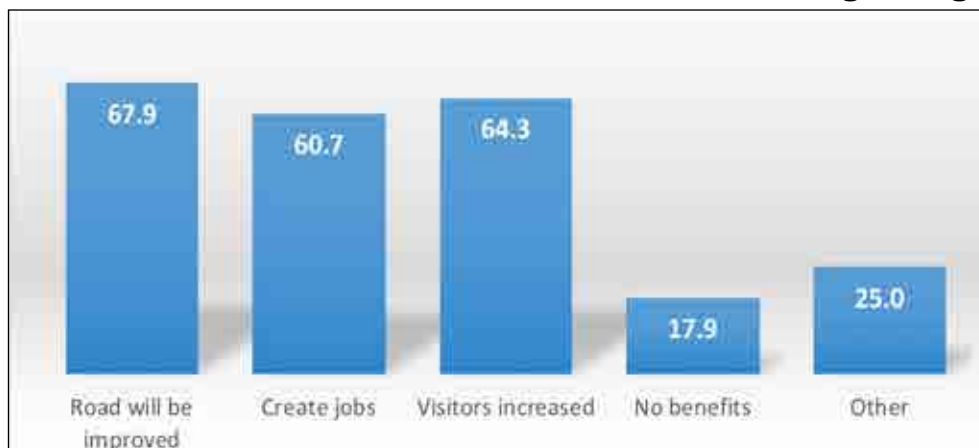


Figure 20 above: Results from when the villagers were asked about what kind of benefits they expect from the national park, shown in percentage.

Even though the questionnaire shows, that very few do not believe in any benefits from the establishment of the NP (17,9%) we have data from multiple interviews, stating this. Agustin was one of these villagers:

So far there has not been any positive changes with the establishment of the national park because of the bad road. We just want the road to be improved but we properly won't get one. The logging company built the road, which is why it is in such a bad condition. The government should build us the road.

Augustin did not believe that the NP would create any change for them in Engkeranji if the government did not improve the conditions of the road, which he did not believe that they would. In multiple interviews we were told that many government officials had promised to built them a road before but it had never happened, which can explain some of the villagers mistrust.

Part Conclusion

Our results showed how the preferred means of transportation depended on the HH's position to the road and the stream. Some of the products were mainly for self-consumption whereas some also sold the products to the local market. Before the roads establishment villagers sold paddy to a middleman coming by boat, but the road supposed a change of middleman making villagers less focused on selling paddy as a cash-crop and more on selling the pepper. The reason for this change can beside the middleman also be that the market price on pepper was more stable.

The lack of accessibility also made many younger villagers migrate permanently or for a couple of months to urban areas due to continuing education or finding a job. Most of the rural-urban migrants send remittance home to their rural HH, which are important for the farmers especially when getting old, because lack of labourforce within the HH could force them to decrease the size of their cultivated land. Many villagers believed that the establishment of the NP Gunung Lesong could benefit them by getting an improved road and increased amount of jobs in the area. The Headman Wilson and Engkeranji village were, by networking with government officials, influencing the decisions being made regarding the NP and eco-tourism.

Discussion

Result Discussion

Both the objective and the research questions have been modified from our first proposal from the synopsis. Before arriving to Engkeranji, we thought that the establishment of the logging road had created major changes on their agricultural practices and highly increased the rural-urban mobility. Furthermore we expected that the establishment of the NP had already created changes in their livelihood. Once we arrived, we realised that the road condition was so bad that the creation of the road did not create major changes in the Engkeranji villagers livelihood strategies.

Also before going to the field, we assumed that the flooding events were a major issue for the villagers. Once there, we learned that even though it is a problem for some of them, the floods do not have as big a role that we expected it to have on the inhabitants lives.

Therefore we decided to rearrange the research questions focusing on the benefits and constraints of both ways of transportation (river and road). Then we related these benefits and constraints with the three main topics that our results showed were affecting the inhabitants livelihood the most: The agricultural practices, and to what extent they were affected by the accessibility; the rural-urban migration, and how this affect the inhabitants that stay in the village; and the implementation of the NP, and the future expectations that the villagers have from it.

Village Perspective on Future Livelihood Changes

In multiple interviews, the focus group session and in the questionnaire have we got data on how the NP in the future might benefit the Engkeranji villager's livelihood. The results from this data have been that the NP could create more jobs with improved ecotourism. Some villagers also believed that the government will invest more in local road improvements, if they see a potential for ecotourism in Engkeranji and therefore will want to improve the accessibility to the villages. Especially the women at the focus group session emphasized how they hoped that an improved road would make it possible for their children to come home and get a job in the area of Engkeranji, or that an improved road would make it easier for their children to live in Engkeranji with the family and then drive to another town for work. In interviews with two headmen their opinion on whether their children would move back to Engkeranji were different. Martin said:

I expect my children to come home when I get old to take care of me and my wife and for them to continue the heritage and live in a long-house.

The other headman Mounsey did not believe that his kids would move back to Engkeranji if the conditions were not improved:

They wont come back and live in Engkeranji in the future because they have jobs which pay better in the city and they get payment once a month instead of once a year like me.

Earlier in the interview Mounsey had explained how he had been forced to send his children to urban areas for getting jobs because the economy was difficult for him.

Our results are based on data from the Engkeranji villagers who permanently live there and our results are in some ways similar to Hansen's research (2005), that describes how the elder generation in an rural area expect the young people to be on a circular migration where they will come back because it is a part of the Iban tradition (Hansen 2005:187). Some villagers in Engkeranji like Martin believed that the younger generation will come home whereas other villagers as the women participating in the focus group thought that they will come home if more wage jobs are created in the area or if the accessibility is improved in order for the children to live in Engkeranji but work in another town.

When Hansen spoke to the younger generation in her research, the result was that the younger generation living in urban areas did not expecting to come back to the rural village in the future but were looking for off-farm jobs in the urban centres (ibid.:187). Hansen's research shows how it is important to be critical on the fact that our results, on the expectations for the future in Engkeranji, are one-sided because our data only are from the villagers who permanently live in Engkeranji. If we have had more time for conduction research it would have been interesting to interview the rural-urban migrants for getting data on their perspective on the future, eg. if there was a change in the accessibility to Engkeranji and the amount of wage jobs in the area.

The Sustainable Livelihood Framework approach

In relations to the Sustainable Livelihood Framework, we found out that the village had different types of crops growing either for own consumption, cash crops or both. We can draw from this that growing subsistence crops made the villagers less vulnerable towards price fluctuations, and less dependent on the access to markets. On the other hand, it made them more vulnerable towards seasonality, natural conditions and disasters, as well as it made them dependent on their family member, who might be economically dependent on migrating for finding wage jobs for periods of time. The income from cash crops as well as from remittens, increases the financial capital in the HH's. The increased financial capital allowed the HH members to either make savings or invest in means like transportation, for instance cars or engine boats, which enabled them to better market access.

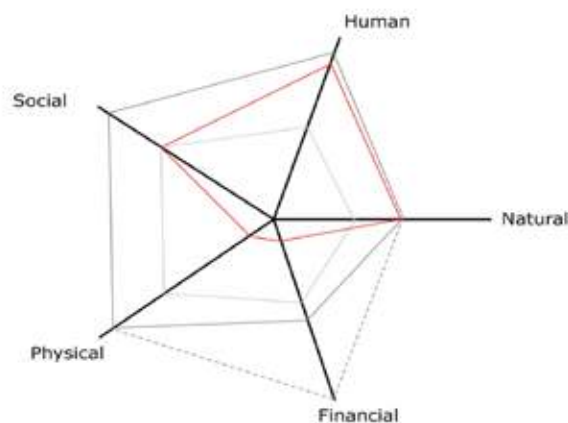


Figure 21, (Thomsen, T. B. n.d) the red line shows an example of a subsistence farmer on Borneo. The outer grey line shows an example on a danish farmer and the light blue is a cash crop farmer in Senegal.

The red line in figure 21 is a good example on how the capitals could be distributed in Enkeranji. The human capital is relatively high, since the farmers competencies are highly developed throughout generations of farming. The natural capital are affected by the climate, which is quite profitable for growing crops and shifting cultivation. The topography as well as the NP boundaries could be a limitation in the natural asset. Though we concluded through resource mapping within the focus group session that the boundaries of the NP was in the top of the mountain, and that the villagers mostly went there for spiritual purposes. The financial capital should be considered very low, since there were poor market access due to the lack of accessibility. Our findings on the low market prices in Engkeranji due to the lack in access proves this as a vulnerable area. The fact that some villagers would sell cash crops despite of low price fluctuations, also proved that some HHs' were more

vulnerable than others. The physical capital is also very low, maybe in our case even lower than on figure 21, because of the lack of infrastructure in the village, making the villagers dependent on river transportation as well as the limitations set by the road conditions. The social capital is relatively high, since Engkeranji as well as the nearby villages consist of close, social relations between the villagers. We experienced that many relatives were spread out in the nearby area and the fact that Engkeranji in many ways was a centerpoint for social activities like the foundational meeting of the eco-tourism committee of the NP, like the Engkeranji primary school in which the neighbouring villages would attend, and headman Wilson's ability to make connections and have influence (see section 'Gatekeeper as a Benefit and Constraint) tells us something about the strong social assets in Engkeranji. Having a strong political influence on the Government is a great asset because in the end, it is the government who is influencing the infrastructural development.

Motives of diversified Rural Livelihood Strategies

Our results show how the HH's in Engkeranji had different sources of income and ways of being self-sufficient in order to be viable. According to Abdullah (2017) this diversified livelihood strategy has happened because HH's in rural areas of Sarawak, Malaysia cannot depend on self-sufficiency as they once used to and, therefore diversification in their livelihood strategies have become a tactic for reducing poverty and increasing their livelihood security (Abdullah 2017:289-292). Our results from the Engkeranji community show different kinds of motivation for diversifying their livelihood strategies. This report is using Ellis (2000) determinants for diversifying livelihood strategies for rural HH's, as a theoretical standpoint to view our results on the main activities and income sources the HH's in Engkeranji have and the motivation behind those livelihood strategies. The results from our research in Engkeranji are mainly about three of the six determinants Ellis present and these three determinants for diversification that we use are seasonality, risk and asset strategies. We have chosen these three determinants because from our results, we can see that the main factors influencing the Engkeranji villagers choices behind having diversified livelihood strategies are seasonality, risk and asset strategies.

Seasonality, Risk & Asset Strategies

Seasonality is when labour activities are diverse depending on the season and the income varying within seasons (Ellis 2000:293). In Engkeranji seasonality was a motivation for diversifying their livelihood strategies. Young villagers living in Engkeranji would from July-September migrate to urban areas for getting a seasonal job, to get an extra income in the HH. Another diverse strategy motivated by seasonality is for some members of the HH to migrate permanently to non-farming occupations and sending remittance as an extra income for the HH. A third diversifying strategy which some of the villagers in Engkeranji do is to sell some of the fish and prawns they catch in the river.

Risk is a motivation for a diversifying strategy in order to be less vulnerable to possible risks (Ellis 2000: 294). In Engkeranji the risks they consider are: Flooding, diseases in the crops and fluctuation in market prices. The HH's in Engkeranji have cultivated their land in different areas to try and avoid flooding ruining all their crops at the same time. For the HH's in Engkeranji to be less vulnerable towards market fluctuation most of them grow multiple cash-crops and are self-sufficient on many different kinds of food sources. Remittance is also a diversifying strategy motivated by risk just as it is motivated by seasonality, because a source of income from a different labour market increases the HH's stability. Asset strategies are motivated, by HH's having a long-term view on their viability. The strategy consists of improving the HH's future income possibilities through investments (Ellis 2000:296-297). In Engkeranji a major asset strategy, which have started to happen within the last couple of decades, are for their children or grandchildren to get a longer education.

Another asset strategy that is seen in the Engkeranji community is their involvement in the establishment of the NP Gunung Lesong. By Engkeranji - one of the most difficult communities to access around Mount Lesong - facilitating the community based ecotourism development committee and networking with the government people who are in charge of the NP, shows how they invest in a long term strategy in order to diversify and improve their future income possibilities.

Despite assets which the HH's and the community can influence, are there also assets which falls outside of their capabilities and requires an outside agency such as a government. Accessibility is an asset which requires an outside agency and is a major player in rural HH's viability and development (Ellis 2000:296-297).

Accessibility as an Asset

Our research in Engkeranji have showed how the lack of accessibility was affecting the villagers livelihood strategies. As presented in the results the quality of the road from Pantu to Engkeranji was controlled by an outside agency, which was the logging company. The village involvement in the NP eco-tourism showed how a part of their strategy in increasing the amount of visitors, is to get an improved road by another outside agency, being the government.

Abdullah's research (2017) links together how accessibility influences rural HH's livelihood strategies in Sarawak and how it affects their agricultural practices (Abdullah 2017:791). Abdullah's research shows how there is a direct link between farmers income and the time it takes getting to a bigger town for selling the products. The longer times it takes to get to a bigger town the more expensive the transportation cost is and the farmer therefore gets less profit. This extra cost makes the HH produce less cash-crops and instead they are more dependent on members from the HH taking off-farm jobs within the community or multi-locality by either having a temporarily or permanent job in a bigger town (ibid.:795-798).

Abdullah's finding fits with our results from the HH's in Engkeranji on how they supplemented their income by receiving remittance. Abdullah's research concludes that the villages located more than one hour away from local markets, are less focused on having a vegetable production and more dependant on wage jobs (ibid.:796-798). Abdullah's study site is different from Engkeranji which can be seen by the focus on different product. Our results showed how the villagers clearly included the accessibility into their agricultural strategies by changing their focus from selling paddy to pepper due to a change in the way it was possible for them to sell their crops.

Multiple Determinants for Diversifying Livelihood Strategies

Viewing our results from Ellis theory on determinants for diverse livelihood strategies and by comparing our results to Abdullah's research, it has become clear that accessibility is an important part of the asset strategy which motivates the HH's in Engkeranji to have diversified livelihood strategies. This theoretical framework have also showed how many other determinants such as seasonality, risk and other asset strategies than accessibility influences the reason behind the diverse livelihood strategies the HH's have. Thereby it is important to be aware that our report has been focused on how the accessibility influence the livelihood strategies for the villagers in Engkeranji, but that other factors than accessibility also influence the villagers livelihood strategies.

Most HH's in Engkeranji had diversified livelihood strategies in order to be less vulnerable but it was not possible for everybody to do it. In two interviews with elder villagers (one of them being Hamdan) we were told that they were not able to be viable in the HH because of their lack of strength for working in the field and changes happening within the family which made them not receive remittance. Instead some of the elder villagers depended on help from the community in Engkeranji for being able to survive.

Method Discussion

There are three concrete methods that generated major reflections when being applied in the field or being analysed afterwards. Therefore, this section will focus on presenting these reflections.

Making the **focus group discussion** with the locals, the headman Wilson's presence lead the first part of the discussion which made it, more of an interview on his opinion to the questions rather than a focus group discussion. In the meantime the villagers were listening to the headman's opinions and only agreed with him without discussing, which made the first topic end within 30 minutes. The headman left before the second topic started and after that, the group started discussing their different opinions like in a focus group session.

We experienced that we gained different data when doing **participatory observation** compared to doing SSI and questionnaires. The answers informants give you can change and knowing, what to ask can be easier when participating (Barth 1980:4-5). An example of that is in figure 22 from when we went harvesting paddy.

Harvesting Paddy Rice (Participatory Observation)

When arriving to the woman's cultivated paddy rice one of the first things we asked, before starting to participate in harvesting, were:

Where are the boundaries of this land?

She looked around at her field for a bit and said that she could not really explain that to us. The day before participating in harvesting, we had done an interview with the same woman, in her household. At the interview we tried to ask, how they can see the boundaries between farmers fields, and there we could not get an answer either. We had thought that the fact of just being in the field, so she could point out the boundaries, would help her in answering the question but we experienced that it was not the case.

We started harvesting the paddy rice with her. Suddenly she shouted that one of us should stop harvesting in an area, because that paddy rice belonged to another farmer. We observed that the person she shouted at, was standing right next to a fruit tree. We rephrased the question and asked if the tree was showing the boundaries of her field? She answered yes and added, by pointing around, that the small water streams which were on the three other sides of her field also were a boundary.



Figure 22 shows how different methods can gain different answers to the same question, by phrasing the question in different ways. In order for us to get data on, how to see the boundaries between farmers land, interview turned out to be a insufficient method for us to use for getting an answer on this. Participatory observation was on the other hand a sufficient method for getting this data.

Participating in harvesting paddy, turned out to be a great method to apply for learning about the field boundaries. Our experience with harvesting paddy have made us think, that it would have been interesting having done more participant observations, especially during the mornings, when most of the villagers were working in their fields and other methodologies like interviews and PRA's were hard to perform.

The **questionnaire** was a face-to-face interview where we had translated the questionnaire into Iban, so that the three groups going out to do the questionnaire would translate it in the exact same way. This translation was done because a disadvantage of doing face-to-face structured interviews can be that the interviewer and translator might formulate the questions differently and the participants then interpret the questions differently (Bernard 2011:190-192). One of the translators ended up not using the Iban translated version that much and instead translated freely, which have made us insecure on how accurate the translation have been between the groups. Another critical reflection on our questionnaire is that it turned out to be unclear whether the participants should answer on behalf of his/hers own activities or on behalf of the entire HH. The questionnaire was intended to be about the entire HH but many questions were formulated as if it was about the person's own activities.

One of the purposes of doing the questionnaire was to compare the data between the five sub-villages to see if there were different patterns. However due to an ambiguity in the general data design and a misunderstanding on how to number the sub-villages this have been impossible to do.

Reflections

Uncertainties in the data

During our stay, we noticed that the indigenous did not perceive time as we are used to. It was a general occurrence that the older generation did not know their age when we interviewed them, and when asking about eg. occurrences in their lives and development in their agricultural practices, we found it very difficult to get an exact answer. Therefore we tried to rephrase the questions in a more understandable way. This uncertainty on time could have had an effect on the results we got.

Concerning the data we used for the aspects of rural-urban migration and NP, we afterwards reflected on how big a focus we had on the agricultural practices in general. We discussed if this was influenced by the UNIMAS students, who mainly had natural science backgrounds, and therefore had more focus on these aspects.

Method/Topic	Accessibility	Agriculture	Rural-Urban Migration and Mobility	National Park Gunung Lesong
GPS Mapping	X			
GIS	X	X		
Soil Sampling		X		
Water Sampling		X		
Observation	X	X	X	X
Participatory Mapping	X	X		
Resource Mapping				X
Participatory Observation	X	X	X	
Focus Group Session	X	X	X	X
Seasonal Diagram		X	X	
Data Matrix	X	X		
Questionnaire	X	X	X	X
Interview	X	X	X	X
The Transect Walk	X	X		X

Figure 23 show the methods being conducted during the fieldwork and a view of what topics the method gave data on. Due to word limitations in the report and focus on solving the objective, not all results gained from the methods have been presented in the result chapter on each of the topics. The figure shows how our focus mainly have been on accessibility and agriculture, where it could have been useful gaining more data from a broader variety of methods on the other two topics rural-urban migration & mobility and the NP Gunung Lesong.

Reflections on the SLF approach

Due to the word limit of the report and the limit in research data which could be used for the SLF approach, we did not do a complete implementation of the framework approach. It was first when we got back from the field study, that we decided that it would be interesting and relevant to look deeper into the element of the framework and how it could be used. We have been able to use some of the data from the questionnaires, PRA sessions and interviews to look into some aspects on it, especially concerning the natural, physical and financial capital. If we had planned on doing the SLF before going in the field, we could have focused the questions more clear to fit the framework.

Conclusion

The aim of this report has been to investigate how accessibility can influence villagers livelihood strategies in Engkeranji, Sarawak. This field research has shown that deficiency of accessibility highly influenced the villagers livelihood strategies, and that the poor access was a constraint for further development. The research also show that other determinants like risk, seasonality and social-political influence are important factors affecting respectively livelihood strategies and accessibility. The villagers agricultural assets showed how they had diversified their resources in order to be less vulnerable. The main cash-crops had changed in Engkeranji though time, either because of price fluctuation or changes in market accessibility. The changes in market accessibility were for instance getting engines on boats, the arrival of the middleman on a regular basis and the establishment of the logging road from Pantu to Engkeranji.

Another aspect of the diversified livelihood strategies were rural-urban migration and mobility, which is highly influence by access. For education further than primary school, children would have to migrate to a boarding school. Furthermore, many young villagers had already migrated to urban areas in order to find a wage job and seeking to improve their livelihood. The increased rural-urban migration of the younger generation had created a tendency being that the elder farmers were decreasing the size of their cultivated land, due to lack of labour force within the HH.

The establishment of the NP had created a future potential asset for development of Engkeranji through ecotourism, wage jobs created due to the ecotourism industry and improved road by the government due to increased amount of visitors coming to Engkeranji. The village and the headman Wilson was highly involved with networking and influencing the government officials on the NP and its eco-tourism. A possibility of further investigation can be to go more into depth with the asset strategies between Engkeranji and Wilson networking with government officials in order to influence Engkeranji's development.

The development of accessibility to Engkeranji and other rural villages in Sarawak can be in the government's interest in relations to increasing the economic growth in Sarawak. On behalf of Engkeranji as well as the Government of Sarawak, it would be a great advantage for the development of the future, if the accessibility in rural areas of Sarawak would be improved and a new road would be build and thereby improve the way to Engkeranji.

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Homepages and apps

Google.maps.com

Google Earth Pro

Figures

- 1a: Sub-villages. Data collected from interviews.
- 1b: Map of Sarawak 2018. QGIS. Google satellite data.
- 1c: Map of Engkeranji 2005. Google Earth Pro.
- 2: Theoretical approaches. Ellis 2000:289,298, Ribot & Peluso 2003:154-173.
- 3: The SLF Framework DFID 1997, Scoones 2015:34-44, Angelsen et al. 2011:72-85.
- 4: GPS data. Garmin GPS.
- 5: Map of GPS tracks. Garmin GPS. Data processed in QGIS.
- 6: Figure 6. Questionnaire. Data processed in SPSS.
- 7: Facilities facts. SSI
- 8: Villagers activities. Questionnaire. Data processed in SPSS.
- 9: Hamdan's story. Interview.
- 10: Purpose of cultivating paddy rice. Questionnaire. Data processed in SPSS.
- 11 & 12: Questionnaire. Data processed in SPSS.
- 13: Matrix ranking. PRA
- 14: Soil sampling. Soil analysis in the lab in Denmark.
- 15: Purpose on livestock and fishing. Questionnaire. Data processed in SPSS.
- 16: Water sampling. Water analysis in field lab and at UNIMAS.
- 17 & 18: Information on rural-urban migration. Questionnaire. Data processed in SPSS.
- 18a: Educational facts from Engkeranji. Questionnaire and SSI.
- 19-20: Information on Mount Lingga and NP. Questionnaire. Data processed in SPSS.
- 21: The SLF approach (Thomsen, T. B. n.d.. lecture about SLF. Ribot & Peluso 2003:154-173)
- 22: Harvesting paddy. PRA.
- 23: Method reflections. Notes in Excel.

Pictures

Front page picture shows the view over the river, the old logging station and the road from Semolong Ulu to Engkeranji. Photographer: Daphnee Ling Hui Ai.

All other photos are taken by the authors.

Appendixes

Appendix I - Methods Used During Fieldwork

GPS mapping	5
Soil sampling	1
Water sampling	1
Forrest assessment	1
Focus group interview	1
Participatory observation	8
Community mapping	4
Matrix ranking	3
Seasonal diagram	3
Questionnaire	1 – 28 participants
Semi-structured interviews	17
The transect walk	2

Figure I.1 Table showing the relation of the methodologies applied in the field.

Appendix II - Method descriptions

This appendix comprises a brief description of each one of the methodologies applied in the fieldwork. The description of the methods follows the same structure and order as the Methodology chapter, dividing the different methodologies in Natural science and Social Science ones.

Natural Science Methods

GIS and GPS Mapping

By using the geographical information system is it possible to obtain local knowledge of physical space and natural resources. The GPS is useful for making landmarks, reporting local conditions and measuring the distances. The data from the GPS is analysed in GIS to get the necessary information and knowledge needed to solve a research question. The spatial analysis can also be used for finding information of the topography of an area (Mikkelsen, 2005:90). During our study we used GPS to create the maps which allowed us to see the length of different places and the time spend on the trips. We used GPS on the first days during the walking with the local people in the exploratory phase, when we could see the surroundings of the village.



Figure II.1 Our group using the maps on the field.

Soil Sampling

This method aims to identify the soil properties and/or parameters. The soil sampling method consists of choosing a plot and take soil samples from different places in the plot.” Sample locations can be chosen using (a) haphazard sampling, (b) judgment sampling, or

(c) probability sampling” (Gregorich & Carter 2007:26). The number of samples from one plot is directly influenced by the size of the plot. This method could be useful to quantify the soil’s deposit of nutrients and calculate the plants demand for nutrients and it could so, identify the amount of input, e.g. manure and/or fertilizer that should be added every year in such way to be sustainable in the time context and efficient in increasing the crops yield context.



Figure II.2 One of our group members taking a soil sample on a pepper field.

Water Sampling

This method is explained in the Appendix III.



Figure II.3 During the water samples analysis on our basecamp, the primary school students came to see our work.

Social Science Methods

Observation

As a research method, direct observation, could help the researcher to collect a lot of information, by observing all the phases into a community. Direct observation makes it possible for the researcher to gain information from locals, without disturbing them in their activities. It is useful to observe the “local indicators” (Mikkelsen 2005:88) to understand how the activities take place in a normally daily life. One important advantage of this method is that it is possible to observe things from the “real world” and in real time. A big disadvantage of the method is that it is time demanding, meaning that the observing period should be done over a long period of time in order to be able to collect thorough information e.g. observing the daily lives changes through the seasons. Another limitation to the method is that the information there is collected only comes from what is being observed by the researcher without to have the opportunity to search more in deep on the reason behind actions. Therefore, combination of different research methods can give the chance to collect more information in a short period of time. The observation was made in the most of the time when we walk through the village or during the different activities at the community hall, like analysing the soil and water samples, different meeting.



Figure II.4 A woman is cleaning the rice in order to prepare it for selling.



Figure II.5 A villager harvest piper.

Participatory Rural Appraisal

Participatory mapping

Participatory mapping is part of a family of approaches and methods where the focus is set on the knowledge sharing of the participants, instead of focusing only on “data extraction”. The PRA methodologies rely on the “popular knowledge”, and similarly to the Rapid Rural Appraisal (RRA) approach, from which the PRA has evolved, it looks up to promote the direct learning from the people, compensating biases, optimizing trade-offs, triangulating and seeking diversity. The main difference between the RRA and PRA approach is that while in RRA the data is more elicited and extracted by outsiders, in the PRA the whole process relies more in the local people (Chambers, R. 1994a:1253-1268; Chambers, R. 1994b:1437-1454; Chambers, R. 1994c: 953-969).

The PRA social mapping is a visual method that could be used to gather basic information about the field site. It is a methodology that is developed with a group. A group discussion is held in order to agree upon the main criteria that should be evaluated and after that those criteria are symbolised on a map drawn by the group (Mikkelsen 2005:88-89).



Figure II.6 Some villagers drawing on a participatory mapping session.

Participatory observation

Participatory observation is a method where you participant with the informant in their everyday life in order to learn about their daily life and culture. The method is a way of gaining data through an embodiment and to get the informant to act naturally and spontaneously. The well-know setting for the informant can improve the possibility of gaining rapport. Despite that participant observation gives you knowledge about what is important in their life which can be used to ask the right questions (Bundgaard 2010 [2003]:56-57; Barth 1980:4-5). The participatory observation will however have its limits because you can never fully capture their way of thinking and understanding their culture, especially not fieldwork there are being carried out in a short amount of time (Bernard 2011:256-290).



Figure II.7 One of our group members harvesting rice.

Focus group

A focus group consist of a selected amount of participants who should discuss a specific topic. A focus group can get data on social groups' interpretations, interactions and norms. An important limitation with this method is that the group dynamic can influence their answers - especially if they know each other and therefore has to consider the effect their answers can have on their social status in the vil-lage (Bernard 2011:172-186).



Figure II.8 The focus group session about accessibility.

Seasonal diagram

Seasonal diagram is a method used to get data on the variations there are in an informant and the village's daily life, traditions etc. throughout a year. The method can especially be useful when the field-work is conducted in a short period of time in order to get an understanding of the changes there are in the different seasons because it cannot be experienced. Seasonal diagram gives a broader understanding of the data conducted and clarifies the differences there are throughout the year (Mikkelsen 2005:92).

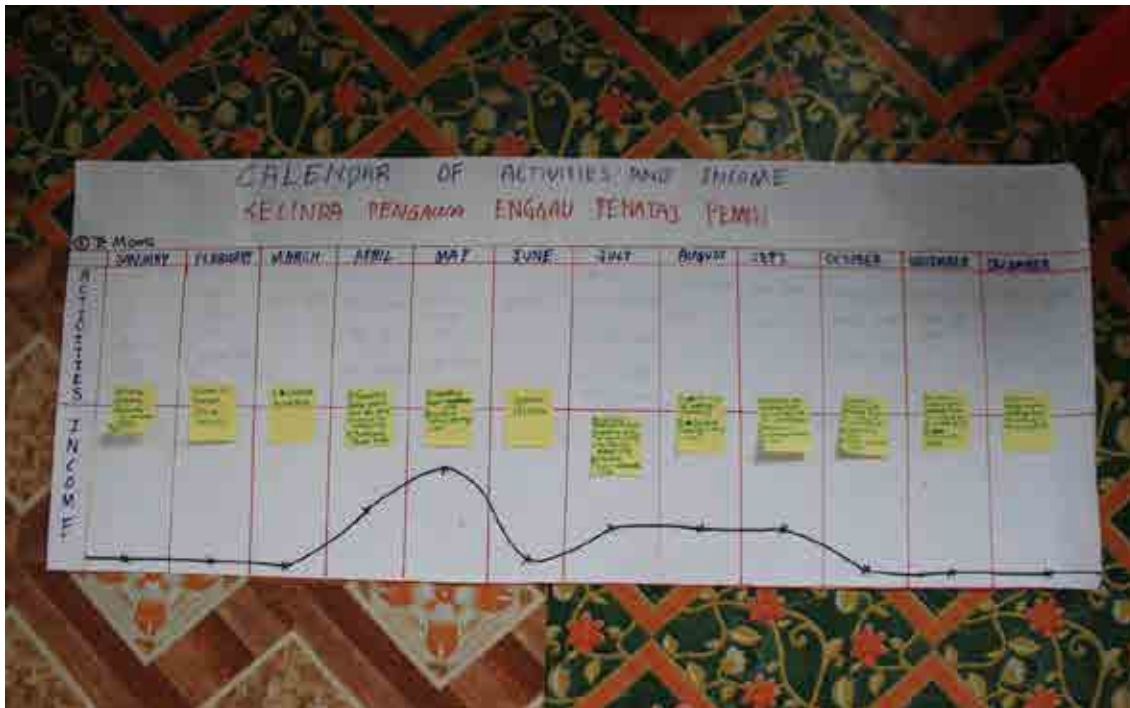


Figure II.9 The output of a seasonal diagram, with the activities handwritten in Iban, an English translation on post-it's and the income graph.

Matrix Ranking

Matrix ranking is a methodology that gathers information through comparison and helps to identify people's criteria for certain topics. The criteria may change from one group to another, therefore, splitting the groups could be more interesting than doing a joined matrix. Using local materials such as seeds and stones can make it easier for the illiterate villagers, but in case that is done with literate people, is important to avoid being patronizing (Mikkelsen 2005:99-100).



Figure II.10 A group of villagers participating on a matrix ranking.

Questionnaire

Some of the advantages with the quantitative method questionnaire is that it gives us the possibility to collect big amount of data in a short period of time and that the data in the statistical analysis can be compared and therefore quickly give an overview of what is being researched.

The disadvantages with the questionnaire as a method is that it is a standardised and structured method which leaves no possibility of going into depth with informants answers and therefore getting a deep understanding of the research topic. A questionnaire is in a higher degree than interviews formal, where the respondent are not given the opportunity to use his/her own language to answer to the question and is often “forced” to choose an answer through some predefined categories.

When making a questionnaire there should be put a lot of consideration into how the questions are formulated. The questions should be easy to understand and not too long. Things there should be avoided when making a questionnaire is double or triple questions and the choices of answers should cover most all common answers so that the respondent is able to select a answer that relates his/hers thoughts. Leading questions must be avoided so the question does not create an impression that a certain answer should be given in order to avoid that we make the respondent bias (Casley & Kumar, 1988:68-70).

Semi-Structured and Informal Interviews

Interviewing is often based on a written list of questions or checklists, and could be used as a supplement to questionnaire. Semi-structured interviews are semi-formal, with an interview guide, and the questions are “open-ended” (Mikkelsen, 2005:89). The questions in a semi-structured interview would sometimes be supplemented with a sub question or the answers could lead to relevant improvised sub-questions depending on the issue. Unstructured interviews are more informal, usually in form of an improvised conversation. Interviews can either be performed individual, allowing individual viewpoints, groups or as focus group interviews, capturing group norms and interpretations. The interviews are used for collecting data, which could be done by recording and transcribing and/or by taking notes. Some of the uncertainties by doing interviews are the considerable variation in the way different people interpret, percept and experience the world (Mikkelsen, 2005:89).

The Transect Walk

The transect walk is when an informant shows you around a specific area. It can be used as a method in order to get an overview of a specific area and to start an informal conversation about the space, actors involved, what activities is being done there etc.. The method can be useful in the very start of a field-work to get a quick overview of the field there is being studied (Spradley, 1980:77-78).



Figure II.11 Headman Wilson is guiding our group on one of the transect walks through Engkeranji.

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Appendix III - Water Sampling Results

The water sampling was performed in two different stations. The station 1 was situated in the main river (Batang Strap) and the station 2 was situated on a tributary stream close to Engkeranji village. A few parameters were measured on the sampling points, using a multi-parameter sensor:

	Station 1	Station 2*				
		1	2	3	4	MEAN
Temperature (C°)	27,0	25,6	25,6	25,6	25,6	25,6
Pressure (mmHg)	758,3	758,1	758,0	758,0	758,0	758,0
DO - Dissolved Oxygen (%)	34,0	85,4	83,5	83,6	79,9	83,1
DO- Dissolved Oxygen (mg/L)	2,71	6,98	6,82	6,83	6,53	6,79
SPC - Specific conductance (mS/cm)	0,016	0,013	0,012	0,012	0,012	0,012
C - Conductivity/Conductance (mS/cm)	0,017	0,013	0,013	0,013	0,013	0,013
TDS - Total Dissolved Solids (mg/L)	10,40	8,45	7,80	7,80	7,80	7,96
Salinity (ppt)	0,01	0,00	0,00	0,00	0,00	0,00
pH	5,82	7,66	7,28	7,28	7,19	7,35

Figure III.1 Values of the parameter measured on the sampling points.

* There were performed 4 different measurements in the station 2. It used the mean value for the Water Quality Index calculation.

Some other parameters were measured later on the basecamp, using the equipment that the UNIMAS lecturer bring to the field:

COD - Chemical Oxygen Demand (mg/L)	1	2	Mean
Station 1	39,00	36,00	37,50
Station 2	1,00	0,00	0,50

Figure III.2 Measurement for the Chemical Oxygen Demand.

PO ₄ ³⁻ - Phosphates (mg/L)	1	2	Mean
Station 1	0,00	0,00	0,00
Station 1 - Filtered*	0,03	0,00	0,02
Station 2	0,11	0,06	0,09

Figure III.3 Measurement for the phosphates.

* The first lecture of the Station 1 showed up that there were not any phosphates, and the UNIMAS lecturer decided to perform the measurement again but after filtrating the sample, since he thought that the suspended solids may alter the lecture.

NO ₃ ⁻ - Nitrates (mg/L)	1	2	Mean
Station 1	0,00	0,00	0,00
Station 2	0,01	0,01	0,01

Figure III.4 Measurement of the nitrates.

NH ₃ - N - Amoniacal Nitrogen (mg/L)	1	2	Mean
Station 1	0,00	0,00	0,00
Station 1 (DR/890)*	0,06	0,08	0,07
Station 2	0,03	0,02	0,03

Figure III.5 Values for the amoniacal-nitrogen.

* The measurement of the NH₃- N was performed on the DR900 - Hach Colorimeter, but since the station 1 result was zero, the UNIMAS lecturer decided to do it again in the DR/890 - Hach.

The rest of the parameters were measured by the UNIMAS lecturer on the laboratory facilities in Kuching:

TSS - Total Suspended Solids (mg/L)	1	2	Mean
Station 1	10652	12902	11777
Station 2	28	39	33,5

Figure III.6 Values for total suspended solids.

Station	Initial DO (mg/L)	Reading 1 (mg/L)	Reading 2 (mg/L)	BOD 1 (mg/L)	BOD 2 (mg/L)	Mean (mg/L)
Station 1	2.71	0.02	0.03	2.69	2.68	2.69
Station 2	6.79	6.58	6.61	0.21	0.18	0.20
Remarks: The organic matter in the water sample exceed the DO in the water sample						

Figure III.7 Calculation of the Biological Oxygen Demand.

Once that all the parameters were measured, the sub-indexes for the Water Quality Index (WQI) of the National Water Quality Standards for Malaysia were calculated, as well as Water Quality Classification for each of the sub-indexes (DOE 2007: 72):

	Station 1	Station 2
DO (%)	34	83,1
SIDO	26,4242	92,0020618
DO (mg/L)	2,71	6,79
Water Quality Classification	Class IV	Class II
BOD (mg/L)	2,69	0,2
SIBOD	89,0213	99,554
Water Quality Classification	Class II	Class I
COD (mg/L)	37,5	0,5
SICOD	55,66712459	98,435
Water Quality Classification	Class III	Class I
NH ₃ -N (mg/L)	0,07	0,03
SIAN	80,65427326	97,35
Water Quality Classification	Class III	Class II
SS (mg/L)	11777	33,5
SISS	0	79,4167455
Water Quality Classification	Class V	Class II
pH	5,82	7,3525
SIpH	87,881092	97,7874997
Water Quality Classification	Class III	Class I

Figure III.8 Calculation of the quality sub-indexes and the Water Quality Classification depending on them (DOE 2007: 72).

Finally, the Water Quality Index was calculated, as well as the Water Quality Classification for each one of the stations (DOE 2007: 72):

	Station 1	Station 2
WQI	54,28	93,95
	Class III	Class I

Figure III.9 Calculation of the Water Quality Index (DOE 2007: 72).

Appendix IV - Questionnaire

General information just for us to fill out:

GPS-point: x:_____y:_____	Interviewer:
Sub-location:	Group number:
Note taker:	Translator:
Picture	Date and time:

Past - Present



Hello our names are _____ & _____. We are with a university in Denmark and UNIMAS making a field study here in this village. We are researching how the road and river influences your daily lives. We would like to ask if you would participate in a questionnaire, that we have made. The questionnaire consists of a few general questions, which could later be elaborated in a in depth interview, if you wish to participate. You will be anonymous and the questionnaire will only take about 15-20 minutes to answer.

General information

1. Name: _____
2. (Gender: Female _____ Male _____)
3. How old are you approximately? _____
4. Marital status:
 - a) Single _____ b) In a relationship _____ c) Married _____ d) Divorced _____ e) widowed _____
 - f) other _____
5. What is your status in the household? _____
6. Occupation (Can choose more than one)
 - ☐ a) Student
 - ☐ b) Farmer
 - ☐ c) Fisherman
 - ☐ d) Works in the city/bigger town
 - ☐ e) Housewife
 - ☐ f) Retired
 - ☐ g) Other _____
7. What is the highest level of education that you have finished?
 - ☐ a) None
 - ☐ b) Primary school
 - ☐ c) Secondary school
 - ☐ d) Certificate
 - ☐ e) Diploma
 - ☐ f) Bachelor at the university
 - ☐ g) Master at the university
 - ☐ h) Other _____

Activities, income and transportation

8. What activities do you do?
 - ☒ ☐ a) Pepper farming
 - ☒ ☐ b) Rice farming
 - ☒ ☐ c) Rubber farming
 - ☒ ☐ d) Fishing
 - ☒ ☐ e) Livestock production
 - ☒ ☐ f) Other _____

9. (If they answered E in question nr.8 then ask this question) What livestock do you have?

- ☐ a) Chicken ()
- ☐ b) Duck ()
- ☐ c) Pig ()
- ☐ d) Fish ()
- ☐ e) Other _____

10. Rank your activities according to what gives you the highest income (nr. 1 is your highest income, nr. 2 second highest and so on – if the crop is ONLY for self-consumption do not list it.)

- a) _____ Pepper
- b) _____ Rice
- c) _____ Rubber
- d) _____ Fishing
- e) _____ Livestock
- f) _____ Other _____

11. Have the size of your land or the amount of fishing/livestock activities changed during your time as a farmer?

	Rice	Pepper	Rubber	Fishing	Livestock	Other
Bigger						
Smaller						
The same						

12. What are the reasons for the activity change (They can choose more than one)?

	Rice	Pepper	Rubber	Fishing	Livestock	Other
The establishment of the road						
Age – I have become old						
Price fluctuation						
Lack of labour force (migration)						
Flooding of fields						
Middleman started to come to Engkeranji						
Other: _____ —						

13. How often do you meet your relatives in neighbouring villages?

Answer: _____

14. What transport vehicles do you own in your household?

- ☐ a) A car
- ☐ b) A boat with an engine
- ☐ c) A boat without an engine
- ☐ d) A motorbike
- ☐ e) None
- ☐ f) Other _____

15. How do you sell your products?

- ☐ a) Go to a bigger town and sell it to a middleman
Which town? _____
- ☐ b) Go to a bigger town and sell it directly (no middleman)
Which town? _____
- ☐ c) Middleman comes to Engkeranji to buy my products
- ☐ d) Sell to neighbours within Engkeranji
- ☐ e) Sell to the neighbouring villages _____
- ☐ f) Other _____

16. (If they answered a or b in question nr.15, then ask this question) If you sell your products in a bigger town then how do you transport your products there?

- ☐ a) By car
- ☐ b) By boat
- ☐ c) By motorbike
- ☐ d) Get a ride with others
- ☐ e) Other _____

Forest resources

17. What do you use the forest for?

- ☐ a) Hunting
- ☐ b) Natural resources _____
- ☐ c) Spiritual use
- ☐ d) Agroforestry (e.g. fruit trees & rubber trees)
- ☐ e) Other _____

18. Do you do any farming at Mt. Lingga

- ☐ a) Yes
- ☐ b) No

If the respondent's answer is yes, find out exactly where the farming is being done and what is being planted

19. Will the establishment of the national park limit your use of the forest?

- ☐ a) It will prohibit me from hunting
- ☐ b) It will prohibit me from collecting natural resources
- ☐ c) It will prohibit me from conducting spiritual ceremonies
- ☐ d) Cannot expand my land because of the national parks boundaries
- ☐ e) No

f) Other _____

20. What are the benefits of the establishment of the national park?

- ☐ a) The road will be improved
- ☐ b) Create jobs – increased income
- ☐ c) Increased number of visitors to Engkeranji – increased income
- ☐ d) No benefits
- ☐ e) Other _____

Rural-urban migration

21. Who in your household work/study in the city (household status)?

- ☐ a) No one
- ☐ b) Yes. Who? _____

22. Do you receive remittance?

- ☐ a) Yes
- ☐ b) No
- ☐ c) Other _____

23. If yes in question no. 22, specify what kind of remittance (e.g. Food, money, goods, assistance)?

Thank you for participating in the questionnaire, we really appreciate it.

Will it be all right if we might contact you again for further questioning? (Can we come by one of the days)

Appendix V - Interview Guideline I

General semi-structured guideline that was used in the start of the fieldwork

Accessibility

How long time does it take to go to Pantu by boat and by the road?

How much does it cost going to Pantu by boat and by the road?

Do you prefer going to Pantu by boat or by road? And why?

How much do you approximately earn when going to Pantu and sell your cash crops?

Agriculture

Have there been changes in your agriculture? (crops you use)

Has the size of your land changed (bigger/smaller)? Why?

What do you do now that the price on the pepper is low?

Environmental issues

How does the flooding from the river influence your lives?

Does the flooding affect your land?

Does the rain and/or floods affect the road? What do you do?

Where does the water you use come from?

Has the amount and kind of fish and scrimps changed throughout the years?

National park

Have the establishment of the national park created any limitations of using resources in the forest?

What opportunities do you think that the national park in the future? (jobs within eco-tourism).

What is your view of protecting the animals and the nature (conservation) in the national park?

Rural-urban mobility/migration

Does any in your family work or take education in a bigger town? Who?

How often are they home in the village?

Do they come home and help with harvesting?

Do you expect them to come home and live here when they get older?

20. Do you receive remittance from them? (how much)

Appendix VI - Interview Guideline - Teachers (with answers)

Cikgu Hazmi, Cikgu Sedno, Cikgu Cindy

1. When the school was established?

In 1960s

2. What is the total number of children in this school?

23 pupils. Sekolah Kurang Murid (SKM) is a school which have less than 30 pupils. So their classes are different. Primary 1 & 6 are a single class while Primary 2 have to combine with Primary 3 pupils, Primary 4 with Primary 5. They have only 1 pupil in Primary 4.

3. What subject do you teach?

CH: , CS: , CC: English

4. How long have you been teaching in SK Engkeranji?

CH: 2013, CS: 2016, CC: 2017

5. Where do you come from?

All from Sri Aman

6. How often do you go back there?

Every weekend

7. How often do you generally go to bigger towns?

Sri Aman: every weekend, Kuch: once a month

8. Why do you go there?

To buy groceries & meet their families at hometown

9. What kind of transportation do you use?

By 4x4 car. They carpool until Pantu

10. What kind of vehicle do you own?

A car. They park at Pantu

11. What do you think about the transportation to Engkeranji?

Prefer by road because transportation is risky due to tidal bore & crocs. Before this there was case of boat sank into the river.

12. How does bad road affect you?

Cannot access by their own car.

13. If you were a teacher in SK Engkeranji before 2010 (when the road was established), then how did you travel to other towns?

-Not applicable-

Appendix VII - Interview Guideline II

Guideline for in-depth interviews on different topics - used halfway through the fieldwork

Choose which topic the interview should be about and ask some of the questions, which will be relevant for your interview.

Accessibility, selling crops and the middleman

For what purpose do you use the road?

For what purpose do you use the river?

- Do you go fishing?
- Do you sell the fish you catch?

What are the advantages and disadvantages of using the river and the road as transportation?

- Erosion on the road - then what do you do?
- Is flooding a problem for transportation on the river or the road?
- Do you use the river more as a form of transportation when the road bad because of heavy rain/erosion/flooding?
- Does flooding create any other problems for you/the village? Why?

What crops do you grow?

Do you sell any of the crops?

Can you in details explain how it works when you sell your products?

- Can you in details explain how it works when selling to a middleman who comes here to Engkeranji?
 - Do you contact him and then he comes here? How much time does it take from you call until he comes?
 - How many should be able to sell before he comes/you will call him?
 - Does he buy more than one type of crop?
 - What is the price for the crop when selling to a middleman here in Engkeranji, a bigger town or selling directly?

What do people who don't have a vehicle do?

Can you describe how it works if you sell your crops to a middleman in a bigger town such as Panto or Lingga?

- What transportation is being used and why this type?
- What is the price for transportation?
- What is the price you get from the middleman in there?

Can you describe how it works if you sell the crop directly, without a middleman?

- Price for crop and expenses for transportation

Has there always been a middleman coming to Engkeranji?

- How does he get here?
- Did he come here before the road was established in 2010? - then how?

Why do you/does others use a middleman?

Fertilizer, income and agriculture

What crops do you grow?

Did you use to grow other crops? - if yes, why the change and when did you change it?

How big is your land (how many trees)?

Has the size of your land changed?

Have the size of land changed to smaller because your children have moved to the city?

How was it when you were young? Did you stay in the village and help with farming?

Has there been a change with this?

Where is your land? (Point out the direction)

Do you get help with harvesting? Who helps? Do you pay them a salary?

How often does he/she come and help, and with what?

What kind of fertilizer do you use?

How much fertilizer does your crops need for a year?

Do you mix your fertilizer with other types? Why?

What is the price of the fertilizer?

How would you describe the soil on your land? (is it good, bad - try to describe why)

How much do you sell per year?

How much do you earn per year?

What are the possible expenses for you growing your crops?

How do you sell your crops?

What kind of transportation do you use? Why use this kind?

Rural-urban migration - interview for the household who live in Engkeranji

Does anyone in your family work or study in another town?

Who is it?

Where do they live?

What do they do? - government, private or self-employed

Is the job a seasonal job?

When did he/she move from Engkeranji?

Why did he/she move?

How often is the person home in Engkeranji?

How many days is the person staying here?

Does the person bring something to you can they come? What?

Does the person help you with something specific when he/she is here?
Do you send something to the person? - How do you send it?
Do you receive money or goods from them? - How often?
What do you use the remittance for?
Is the remittance (including goods, assistance and money) an important part of your income/economy?

Rural-urban migration - Interview for the migrant

Where do you live?
What do you do?
When did you move away from Engkeranji?
Why did you move to a bigger town?
How often are you home in Engkeranji?
How do you get here? (Transportation)
For how long are you home (days)?
Can you in details describe what you prepare, do and bring when coming here?
Do you help your family with remittance?
What kind of remittance is it?
What do you do when being here?
Do you help when being here? E.g. with harvesting, transportation or repairing/building on the house?

- Do villagers give you things to transport with you when going to the city to either others or yourself?
- Did you do education in a bigger town?
- If you could do higher education in Engkeranji would you then have stayed here? OR if the road was good and you good drive back and forth within the same day do you then thing you would have moved for education?

National park

Where is your farming land? (point)
What do you use the forest for?
Do you hunt?
Do you get natural resources from there?
Do you grow things in the forestry? E.g. rubber trees or fruit?
Do you use it for spiritual use? Can you describe how?

Where do you go and do these activities? (make them point)
How often do you go in the forest and use it?

Are you a part of the forest community?

What do you think about the establishment of the national park?

Do you go to the area where they have chosen that the national park should have its boundaries?

What do you do in that area?

Will the national park affect you in any way? How?

Do you think that the creation of the national park will create a difference/change in Engkeranji? What kind?

Do you think that the national park improve the road? If yes when do you think that it will happen?

Do you think more tourists will come here?

Do you think people from this village will be hired to work in the national park?

Appendix VIII - Seasonal Diagram Results

January	February	March	April	May	June	July	August	September	October	November	December
It's raining season so they cannot do much work. Raining season last from December to mid-January. There are flooding in this period. Weeding and applying pesticide on paddy	Fertilize the pepper and oil palm. Some will start fishing and sell them so they will have an increased income. At the end of the month people start harvesting rice.	Continue to harvest rice. They have no income. Used to sell rice but because the middleman on the boat does not come anymore then they only use rice for self-consumption.	Harvest pepper and sell it. They also continue harvesting rice. There will be an increased income here.	Harvest and sell pepper. Harvest rice. Fertilizer for pepper is so expensive so the money they earn will be used on fertilizer. Those who fish will earn more on selling fish than those who farm pepper in this month. Only young people can go fishing because it is too cold for the elder people. In the end of May the children from the city will come home and they bring food as presents to their household/village. Parents start to receive remittance from their kids.	The Gawaj festival everyone will be drunk. There are only expenses in this month no income.	The villagers start to work again for example pepper, oil palm and fishing. Some will sell pepper in this month.	Prepare planting seeds in the nursery. Kill weed by using herbicide. Use three types of herbicide. The first one is very strong and is for killing the big weed. The second one is for killing the small weed. The third herbicide they use after planting the seeds and is to kill the newly grown weed.	1) Start paddy seeding (nursery) 2) Start to re-plant paddy seeds 3) Applying pesticides on paddy field for weeding.	Paddy seeding	Continue to replant paddy	Continue to replant paddy

Figure VIII.1 Headman Wilson's seasonal diagrams activities data translated to English. Participants: The headman Wilson is the one doing the seasonal calendar and he does not discuss much with the villagers sitting around.

January	February	March	April	May	June	July	August	September	October	November	December
Weeding paddy and pepper. Fertilize and harvest pepper. No income.	<ol style="list-style-type: none"> 1. Spray pesticide and herbicide on the paddy 2. Harvesting paddy at the end of February 3. Trampling the paddy (take the grains of the paddy with the feet stepping on it) and dry the rice in the sun 4. Weeding and fertilizing pepper. They fertilize first and then they take the "good soil" and put right around the pepper crop. 5. Harvesting and selling paddy and pepper. 	Harvesting, trampling and drying paddy. Weeding, fertilizing and harvesting pepper. Selling rice and pepper.	Do the same as in March	Do the same as in March. Must finish harvesting this month.	Gawai festival	Preparing land for paddy seeding by spraying with herbicide. Weeding and fertilizing pepper. Harvesting and selling pepper.	Paddy seeding in nursery. Feed soil with fertilizer. Fertilize the flowers on the pepper plant so it grows better.	Continue seeding paddy (nursery). Apply pesticide on pepper vine. Spray pepper flower with fertilizer.	Weeding paddy field. Fertilize paddy. Apply pesticide on pepper vine and spray fertilizer on the pepper fruit.	Continue weeding and fertilizing the paddy. Spray pesticide on the paddy. Apply pesticide on pepper vine and spray fertilizer on the pepper fruit.	Do the same as in November.

Figure VIII.2 Headman Mounsey's seasonal diagrams activities data translated to English. Participants: Both genders of villagers from Mounsey's sub-village. The whole year they weed the rubber field in order to maintain it. They sell pepper the whole year.

January	February	March	April	May	June	July	August	September	October	November	December
Nothing to do on the field. Go hunting and fishing. No income. Fertilize pepper.	Start harvesting paddy in the middle of February. No income.	Still harvesting paddy. Not selling.	Dry paddy and grain the paddy out. They sell some rice in April. They fertilize the pepper.	Waiting for the pepper to be ready for harvesting. Sell paddy so income becomes higher.	Harvest festival → get drunk. Use their income from April, May and June for the festival.	The festival is still going on a bit. Start preparing the paddy fields by removing weed. They fertilize the pepper. Youngsters will go to town to find a seasonal job. The income becomes a bit higher.	Plant seeds for paddy fields. It is nursery though.	Plant/replant the paddy on the proper fields. Workers come home from their work in towns to help in the fields.	Harvest and dry the pepper. Plant/replant paddy.	Fertilize the paddy. Plant/Replant paddy.	Fertilize paddy. Replant/paddy. Celebrate Christmas and new year.

Figure VIII.3 Headman Morris sub-village. Participants: Morris son and grandson. They sell the pepper when the price is high so it is not included in the income graph.

Appendix IX - Matrix Ranking Results

Description of the method

Five stones is the highest value and one stone is the lowest value. We made a mistake with the transportation so the kind of transportation they use is the one with stones on.

Criteria/crops	Black Pepper	Rubber	Rice
Fertiliser Price	● ● ● ● ●	●	● ●
Vulnerability to disease & pest	● ● ●	●	● ● ● ● ●
Pest & disease management	● ● ● ● ●	●	● ● ●
Labour price	● ●	●	● ● ● ● ●
Transport by road			
Transport by river	● ● ● ● ●	● ● ● ● ●	● ● ● ● ●
Surplus price	● ● ● ● ●	●	● ● ●

Figure IX.1 Headman Murriss' sub-village. Participants: Headman Murriss a little bit but mainly his son and grandson.

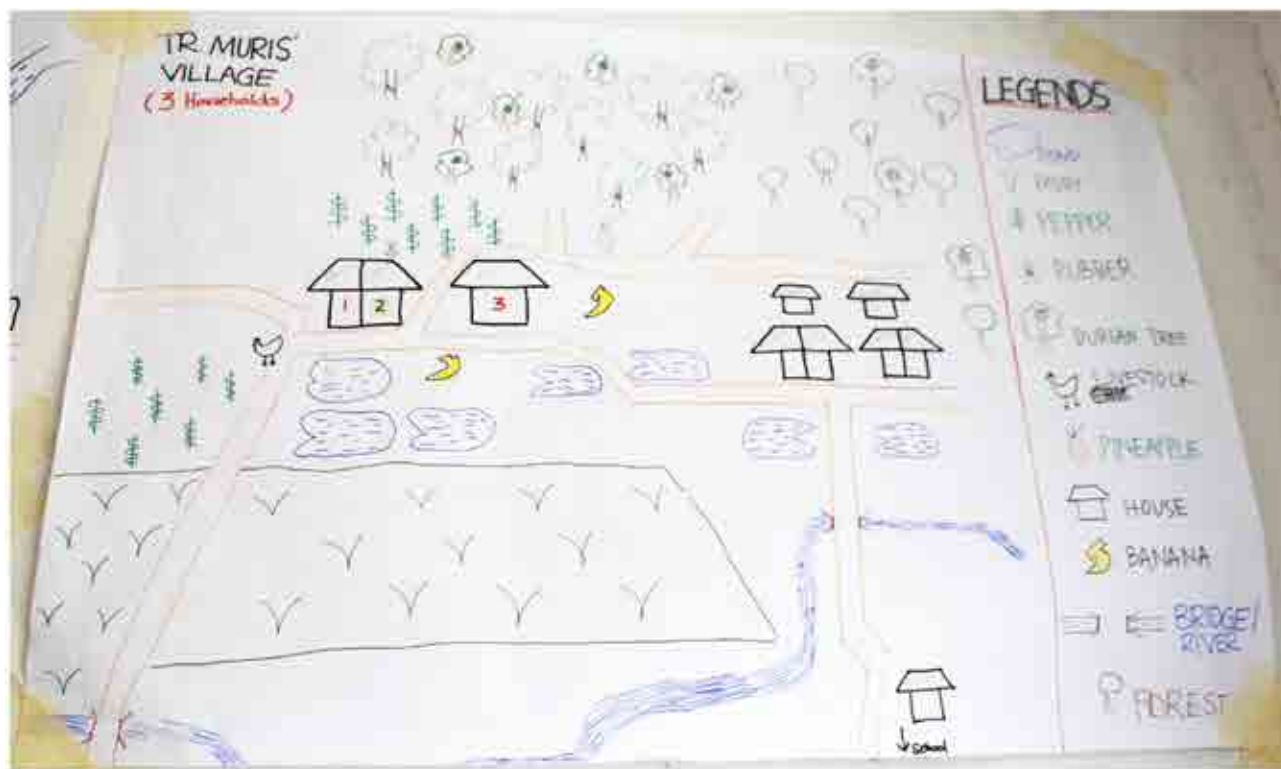


Figure X.2 Headman Muris' sub-village

Figure IX.2 Headman Wilson's sub-village - Women. Participants: Women from Wilsons village.

Criteria/crops	Black Pepper	Rubber	Rice	Oil palm
Fertiliser Price	● ● ● ● ●	●	●	●
Vulnerability to disease & pest	● ● ● ● ●	● ● ●	● ● ●	●
Pest & disease management	● ● ● ● ●	●	● ●	●
Labour price	●	●	●	●
Transport by road	● ● ● ● ●	● ● ● ● ●	●	●
Transport by river				
Surplus price	● ● ● ● ●	●	● ● ●	●

Figure IX.3 Headman Wilson's sub-village - Men. Participants: Only the headman Wilson did the data matrix. The men from the village sat around him but did not participate.

Appendix X - Participatory Mapping Results

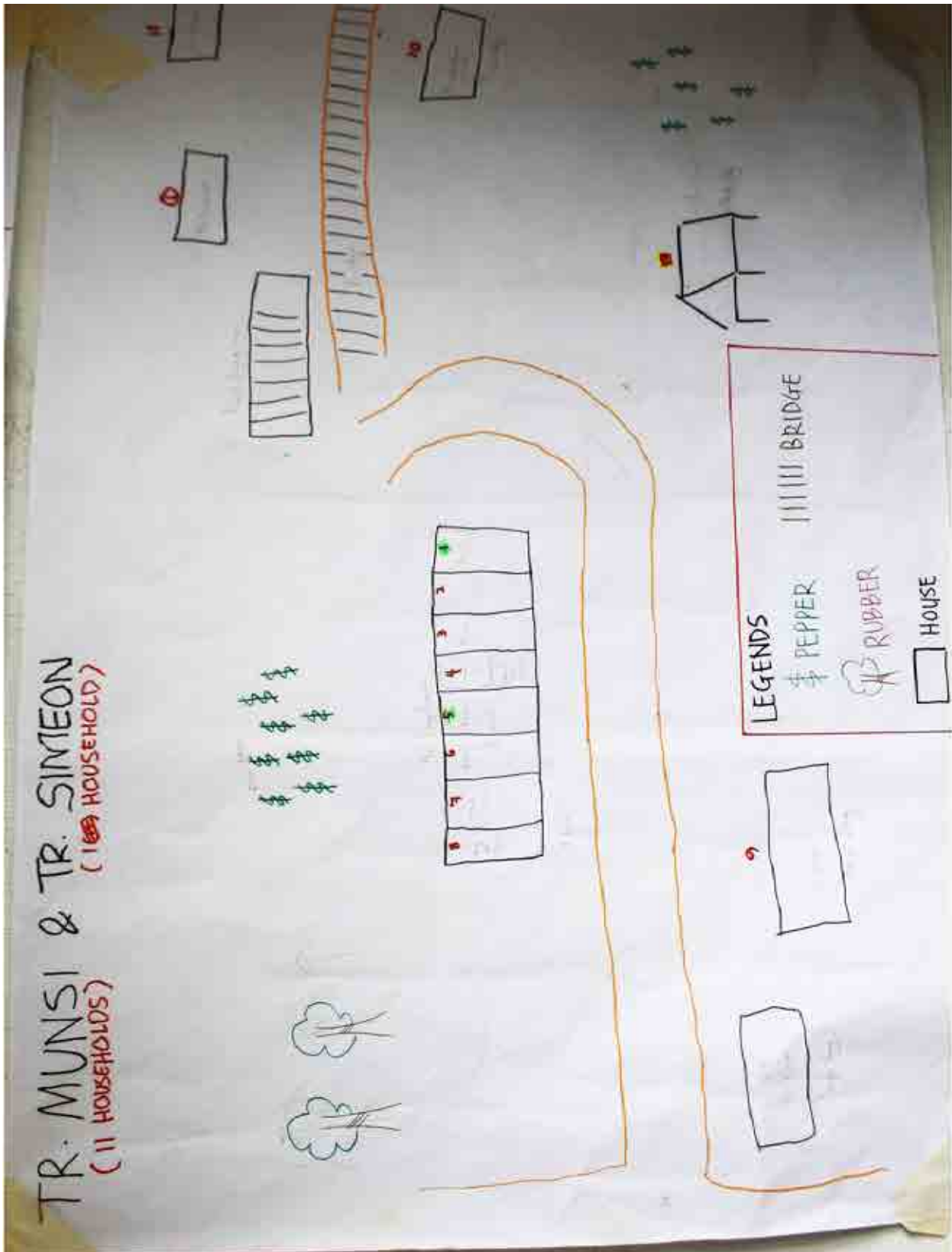


Figure X.1 Headman Mounsey's sub-village.



Figure X.2 Headman Muris' sub-village

TR. MARTIN (C/O HOUSEHOLDS)

LEGENDS

35009107 

House

21 RIVER

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ROAD

AND UNIVERSITY OF

[illegible]

TR
CIVIL



10	ACROSS AN OCEAN
9	ACROSS AN OCEAN
8	ACROSS AN OCEAN
7	ACROSS AN OCEAN
6	ACROSS AN OCEAN
5	ACROSS AN OCEAN
4	ACROSS AN OCEAN
3	ACROSS AN OCEAN
2	ACROSS AN OCEAN
1	ACROSS AN OCEAN

Figure X.4 Headman Martin's sub-village.

Appendix XI - Synopsis

Synopsis ILUNRM SLUSE 2018

**The Changes in Accessibility and its Influence on the Livelihood Strategies
for Villagers in Engkeranji, Sarawak**

Wordcount: 2493

**Authors: Cecilie Bjørk Seeger, Cristian Galalae, Karina Finch Schandorf Petersen &
Pablo Aramendi**

Background Information

In 1971 the Malaysian government introduced the new economic policy in order to reduce poverty and even out the ethnic socio-economic differences to fight the communist insurgency. The new economic policy meant a modernization where the government tried to improve the infrastructure in rural areas, increase the amount of people getting an education, improve the welfare system and create jobs for the locals (Den store danske, 2013).

Within this context, the implementation of oil-palm plantations have grown up at the expense of the traditional shifting agriculture and some other cash-crop production (pepper and rubber). Therefore, during the last decades, the region of Sarawak have experienced a great transformation of it's rural landscape (Cramb, 2013).

The improved economy in Malaysia and Sarawak in the 70's have created a new tendency of rural-urban mobility. The urban growth and increased amount of jobs available have made many people from the rural areas move to the city. The household in the rural village will receives remittance and get a new economic income. The remittance is a way of staying linked to the village and the family. Often the jobs in the city are temporarily and the person will therefore have multi-locality because he/she is living in the city and in the village at different periods. The person sending the remittance is in-between two or more places. This increased rural-urban mobility have created a change in the rural villagers livelihood strategies (Agergaard & Thao, 2011; Resurreccion, 2005).

Introduction to the Study

The research study is being made in the Engkeranji site, an Iban settlement located in the south-eastern part of Mount Lesung. The settlement comprises of three villages, who have their own headmen. In the Engkeranji area logging activities was first established in the late 1970s, contributing to the economical development in the areas. Since 2010, the Engkeranji community became more open for access to the market because of the establishment of the logging road. The road mainly has been established for the logging activities to transport the logs to the log pond in the village surroundings. Since the logging activities stopped in 2015, the road was and still is being used as an access between markets and village. The road has increased the opportunity of rural-urban mobility leading to a change in the villagers livelihood strategies e.g. changes in where the income comes from and young people moving to neighbor towns and cities to get a higher education.

During our research, we are interested in identifying how the accessibility has influenced the settlement livelihood during the time and to determine how this can influence the villages livelihood strategies. We are mainly focused on the roads impact on the settlements livelihood and the rivers possibilities\opportunities to be used as an access way to the village. Furthermore we are interested in finding the role of the National Park establishment and its influence on the community from an economic point of view. The report aims to define the effects of the changes in the accessibility by the road and the river and how they influence the community livelihood.

Terminology

Accessibility

“Adequate access to transport goods and people allow community to enhance their living standard” (T. Soseco, 2016). Adequate access is to reduce the traveling time and transportation costs. The accessibility between the rural and/or rural-urban areas has an influence on the community development. Good access to one community means that the community has a good access to different services and facilities like education, health services, and others. Accessibility can open the opportunities for communities to get better access to market, to buy\sell different products, and contributing to the economical development of the community.

Livelihood strategies

The livelihood framework is a way of gathering information about the complex livelihood components in the rural village. It seeks to give us a better understanding and overview of the many dimensions and standpoints of a person living in the village. The livelihood framework is affected by a vulnerability context (trends, shocks and seasonality) and is based upon assets, which contains Human, Natural, Social, Financial or Physical capital. The assets in the village are affecting local policies, institutions and processes, which leads to the livelihood strategies and outcome of the livelihood (Angelsen et al., 2011).

Rural - urban mobility

Studies points to that the structural transformation which has been going on for the last few decades in Sarawak, is affected by the growing rural-urban mobility (Schatz, R. E., 2015). The once very rural part of Borneo has become urbanized in some regions and since the implementation of roads, mainly invested because of timber production and export, is has opened up towards the rural-urban development, enhancing the accessibility to education, employments and other factors.

Objectives

To study the changes in accessibility and its influence on the livelihood strategies for villagers in Engkeranji, Sarawak.

Research questions

1. How has the roads establishment in 2010 had an impact on the Engkeranji villagers livelihood strategies?
 - 1.1. How was the villagers livelihood before and after the establishment of the road?
2. How is the Engkeranji's agricultural practices influenced by the accessibility to the villages?
 - 2.1. What are the changes and differences in the agricultural practices in the villages?
 - 2.2. How has the road been affecting the development of agricultural practices?
3. What influence does the river have as a form of transportation on the land use and fishing in the villages?
 - 3.1. What opportunities does fishing create for the villagers?
 - 3.2. How are floods affecting the villages?
4. How has the development of the road to Engkeranji influenced the rural-urban mobility?
 - 4.1. How does the rural-urban mobility affect the villagers economy and farming?
 - 4.2. How does the access to education impact the rural-urban linkages?
 - 4.3. What are the differences between the families investment patterns of the remittances?
5. How has the Engkeranji's livelihood been influenced by the National Park establishment?
 - 5.1. What are the Engkeranji inhabitants opinion of the establishment of the National Park?

Methodology

The methods which will be used during the research are interdisciplinary. It is relevant to combine the natural and social science methods in order to get a broader understanding of how the Engkeranji villagers rural livelihoods are connected to their natural resource management. Triangulation will be used to see how the different interdisciplinary methods creates data about the same issue but has different possibilities and constraints when getting the data. The different methods can therefore decrease the constraints of eachothers methods and create a more holistic view of the issue.

In the following paragraphs the different methods that we are planning to use during the fieldwork will be presented. It will be presented in accordance to how we are going to put the methods into use in the field and what data we expect to get from the methods. The description of all the different methods can be read in the appendix named *Method Descriptions*.

Natural science methods

Water sampling

In case that we find it relevant, water sampling could be done on the river that crosses Engkarangji. The samplings aim would be to assess the presence or absence of pollutants and other environmental parameters that may affect the seafood populations and therefore the food security of the villagers of Engkarangji. The expected outcome from the water sampling would be some basic biogeochemical parameters in order to determine the overall quality of the water in the river.

Soil samples

Soil sampling will be performed in some of the fields that are being used for crop production. The aim is to determine if there are any biogeochemical conditions that may have determined the election of a particular type of crop. We expect to triangulate the data obtained with the outcomes of SSI, seasonal calendar and questionnaires in order to determine if the election of a particular type of crop is affected by the accessibility, or in the contrary, there are some specific biogeochemical characteristics that have determined the election.

GIS mapping

GPS registrations, maps and georeferencing are used to get data concerning the accessibility and conditions of the road and river through Engkeranji. It is also used as a tool to make a general area registration in the villages and the paths and their distances and conditions between the three villages. The GPS registration is done on site during the fieldworks and the data is analysed afterwards. Therefore, the expected outcome will be both, some “tracks” for the main access routes (the road and the river, as well as some secondary roads) and the georeferenced “waypoints” referring to the data obtained by the different methods (SSI, water and soil sampling, interviews, etc.)

Social Science Methods

The Transect Walk

The transect walk is a method which will be used in the very start of the field work in order to get an overall view of the village. If possible we could ask the headman to show us around in the village. The method is a quick way of being introduced to other villagers through the informant who is showing us around and to observe what he finds important to show and tell us about. The method will be used to get a quick impression of the Engkeranji villager's life by seeing the agriculture, road, river, housing etc.

Questionnaire

Questionnaire is a method which we are going to use to get broad quantitative data where the answers can be compared in order to see patterns and differences between the households and the three villages. The questionnaire will be done in the start of the fieldwork and has the purpose of being explorative so we get a general knowledge about the households. The questionnaire is meant for one in each household to answer. The questionnaire is used to gain information about the households' changes within agriculture and fishing activities, rural-urban linkages and income. The questionnaire will give data on whether the roads establishment have had an influence on any of the above changes. We also expect to get data on the national parks influence on the villagers.

The questionnaire draft can be read in the appendix but we are expecting to make changes after testing it on a few people in the field.

Interviews

We expect to do a lot of interviews during the fieldwork to understand the Engkeranji villagers livelihood strategies and how the change in accessibility can influence these strategies. Semi-structured and unstructured interviews are the ones we are planning on doing in the field with one or more informants. We are planning on interviewing the headman in the start of the fieldwork to get his opinion on the village's development and the change in the villager's livelihood strategies due to the establishment of the road in 2010. Despite the headman we plan to interview a broad range of villagers in order to try and capture the diversity there is in between the villagers.

Focus Group

We are planning on doing a focus group interview in a weekend where the villagers might have more freetime. The focus group should take place around the topic rural-urban mobility. The participants should discuss their opinions and experiences of rural-urban mobility in their families and in the village in general. We are interested in gathering a heterogeneous group in order to clarify the differences there are between the villagers within this topic.

More specific should the focus group discuss whether the establishment of the road in 2010 has influenced the rural-urban mobility in Engkeranji, the effects rural-urban mobility has on their economic- and farming strategies. If the participants are comfortable discussing it, then

we would also like to get data on how the different families invest their remittances and the reason behind this choice.

Observation

Observation is a method we will use to get data on how the villagers' livelihood in general are in the season that we are there and to see the differences there are in between the villagers such as between families, the three villages, gender, generations etc.. Some of the things which we would like to observe are farming, fishing and transportation in and out of the village. We will try to observe as much as possible and have in mind that it is a good method to use if plans end up changing and nothing is planned for a couple of hours, because the method does not need interaction with the villagers or interpreters and therefore the method can easier than others be done spontaneously.

Participatory Observation

Participant observation can be used to get data on the current way the villagers use the road and river in their daily life and how their livelihood strategies are influenced by the accessibility to Engkeranji. The method can also broaden the knowledge of how the agricultural production works and how the Gunung Lesung National Park is influencing the villagers. It would be good to do participant observation with some of the farmers to get a better understanding of their land and job. We would also like to do participate observation with the transportation possibilities such as walking, car, scooter, boat etc.. We find it important to do participant observation in order to experience the informant in his/hers daily activities. One of the reasons for this is because informants do not always do what they say or the opposite do not think of telling something which from our point of view is interesting to know.

Participatory rural appraisal (PRA)

Mapping & Timeline

The methods mapping and timeline can in our research be useful to combine into one session where we ask villagers to draw different maps according to the time period. We would like to do the exercise with a homogeneous group of villagers where they together draw the maps. The participants can be asked to draw a map from before the road was established in 2010. Then the participants gets a new color and draws on top of the old map to mark the changes there has been after the roads establishment. The red colored marker would be used to symbolise the thinks that has disappeared through time. We would ask questions which would give data about the agricultural changes, change in amount of vehicles, the rivers influence on the land use and fishing. In the end of the session the informants would be asked to draw the floods and how they have been affecting the village.

Seasonal calendar

The goal with making a group of villagers to participate in creating a seasonal calendar is to research livelihood and farming activities in Engkeranji village throughout the year. In addition to this we would also like to know when and how often the rural-urban villagers are home and if they they help with farming in specific times of the year. The knowledge of the seasonal

calendar activities will provide a better understanding of the farming activities, the rural-urban mobility and whether the accessibility to the village changes in the seasons.

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Appendix

Appendix 1 - Method Descriptions

Natural Science Methods

Water Sampling

Since the water sampling equipment would be provided by the UNIMAS water sampling technicians, the exact methodology to be applied would be determined when we meet the counterparts in Kuching.

Soil Samples

This method aims to identify the soil properties and/or parameters. The soil sampling method consists of choosing a plot and take soil samples from different places in the plot. "Sample locations can be chosen using (a) haphazard sampling, (b) judgment sampling, or (c) probability sampling" (M.R. Carter, E.G. Gregorich, 2006). The number of samples from one plot is directly influenced by the size of the plot. This method could be useful to quantify the soil's deposit of nutrients and calculate the plants demand for nutrients and it could so, identify the amount of input, e.g. manure and/or fertilizer that should be added every year in such way to be sustainable in the time context and efficient in increasing the crops yield context.

GPS Mapping

By using the geological information system is it possible to obtain local knowledge of physical space and natural resources. The GPS is useful for making landmarks, reporting local conditions and measuring the distances. The Data from the GPS is analyzed in GIS to get the necessary information and knowledge needed to solve a research question. The spatial analysis can also be used for finding information of the topography of an area (Mikkelsen, 2005).

Social Science Methods

The Transect Walk

The transect walk is when an informant shows you around a specific area. It can be used as a method in order to get an overview of a specific area and to start an informal conversation about the space, actors involved, what activities is being done there etc.. The method can be useful in the very start of a fieldwork to get a quick overview of the field there is being studied (Spradley, 1980: 77-78).

Questionnaire

Some of the advantages with the quantitative method questionnaire is that it gives us the possibility to collect big amount of data in a short period of time and that the data in the statistical analysis can be compared and therefore quickly give an overview of what is being researched.

The disadvantages with the questionnaire as a method is that it is a standardised and structured method which leaves no impossibility of going into depth with informants answers and therefore getting a deep understanding of the research topic. A questionnaire are in a higher degree than interviews formal, where the respondent are not given the opportunity to use his/her own language to answer to the question and is often "forced" to choose an answer through some predefined categories.

When making a questionnaire there should be put a lot of consideration into how the questions are formulated. The questions should be easy to understand and not too long. Things there should be avoided when making a questionnaire is double or triple questions and the choices of answers should cover most all common answers so that the respondent are able to select a answer that relates his/hers thoughts. Leading questions must be avoided so the question does not create an impression that a certain answer should be given in order to avoid that we make the respondent bias (Casley and K. Kumar, 1988).

After the questionnaire draft has been finished, it needs to be pretested before it is applicated on the final phase in order to identify its weaknesses and omissions. The pretested phase is somehow vital for the questionnaire in order to be understood by the respondents and to collect information that could answer the research.

Interviews

Interviewing is often based on a written list of questions or checklists, and could be used as a supplement to questionnaire. Semi-structured interviews are semi-formal, with an interview guide, and the questions are "open-ended" (Mikkelsen, 2005). The questions in a semi-structured interview would sometimes be supplemented with a subquestion or the answers could lead to relevant improvised sub-questions depending on the issue. Unstructured interviews are more informal, usually in form of an improvised conversation. Interviews can either be performed individual, allowing individual viewpoints, groups or as focus group interviews, capturing group norms and interpretations. The interviews are used for collecting data, which could be done by recording and transcribing and/or by taking notes. Some of the uncertainties by doing interviews are the considerable variation in the way different people interpret, percept and experience the world (Mikkelsen, 2005).

Focus group

A focus group consist of a selected amount of participants who should discuss a specific topic. A focus group can get data on social groups' interpretations, interactions and norms. An important limitation with this method is that the group dynamic can influence their answers - especially if they know each other and therefore has to consider the effect their answers can have on their social status in the village (Bernard 2011:172-186).

Observation

As a research method, direct observation, could help the researcher to collect a lot of information, by observing all the phases into a community. Direct observation makes it possible for the researcher to gain information from locals, without disturbing them in their activities. It is useful to observe the “local indicators” (B. Mikkelsen, 2005) to understand how the activities take place in a normally daily life. One important advantage of this method is that it is possible to observe things from the “real world” and in real time. A big disadvantage of the method is that it is time demanding, meaning that the observing period should be done over a long period of time in order to be able to collect thorough information e.g. observing the daily lives changes through the seasons. Another limitation to the method is that the information there is collected only comes from what is being observed by the researcher without to have the opportunity to search more in deep on the reason behind actions. Therefore combination of different research methods can give the chance to collect more information in a short period of time.

Participatory observation

Participatory observation is a method where you participant with the informant in their everyday life in order to learn about their daily life and culture. The method is a way of gaining data through an embodiment and to get the informant to act naturally and spontaneously. The well-know setting for the informant can improve the possibility of gaining rapport. Despite that participant observation gives you knowledge about what is important in their life which can be used to ask the right questions (Bundgaard 2010 [2003]: 56-57; Barth 1980:4-5). The participatory observation will however have its limits because you can never fully capture their way of thinking and understanding their culture, especially not fieldwork there are being carried out in a short amount of time (Bernard 2011: 256-290).

Participatory Rural Appraisal (PRA)

PRA mapping

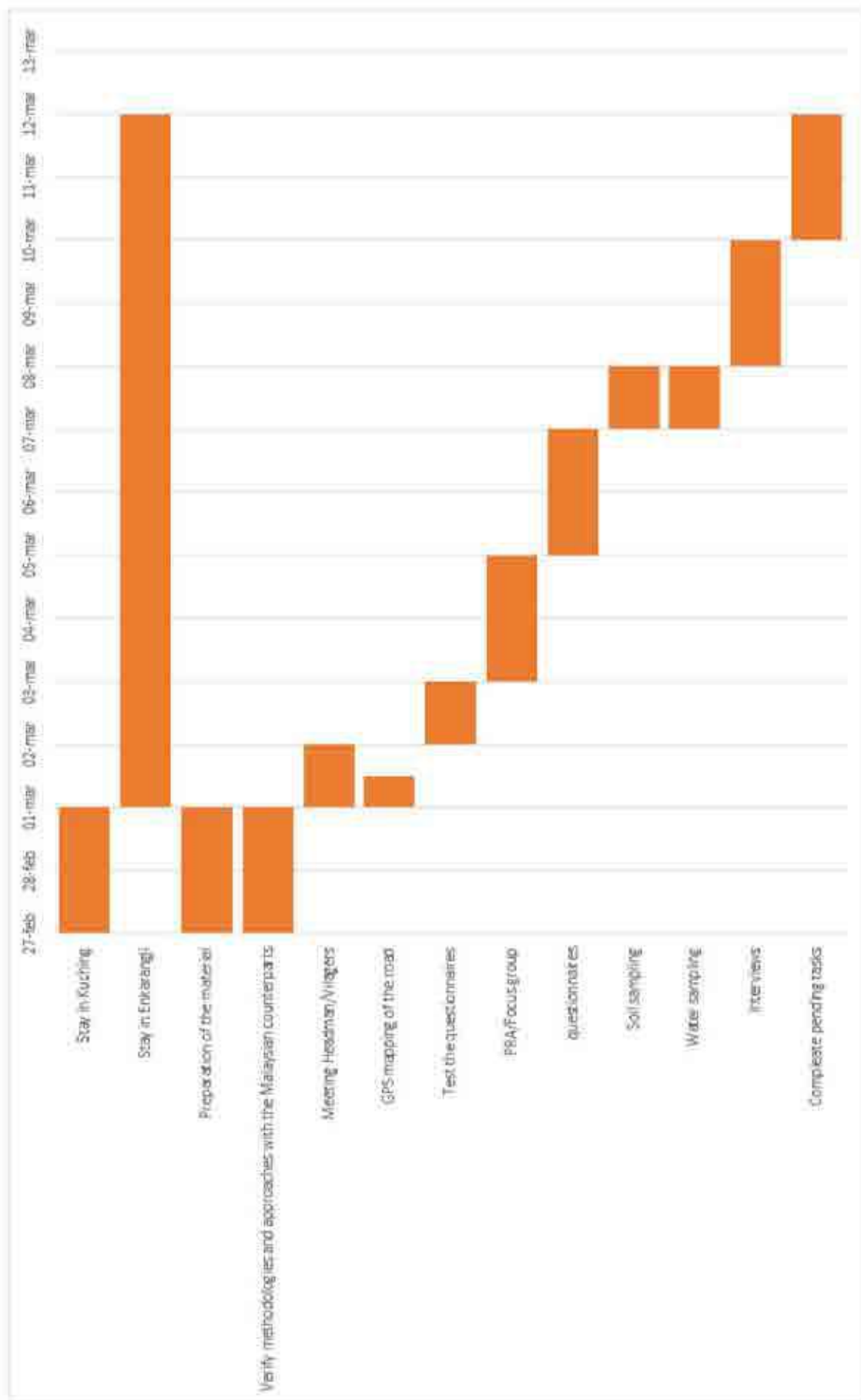
Participatory Rural Appraisal (PRA) mapping is part of a family of approaches and methods where the focus is set on the knowledge sharing of the participants, instead of focusing only on “data extraction”. The PRA methodologies rely on the “popular knowledge”, and similarly to the Rapid Rural Appraisal (RRA) approach, from which the PRA has evolved, it looks up to promote the direct learning from the people, compensating biases, optimizing trade-offs, triangulating and seeking diversity. The main difference between the RRA and PRA approach is that while in RRA the data is more elicited and extracted by outsiders, in the PRA the whole process relies more in the local people (Chambers, R., 1994a, 1994b, 1994c).

The PRA social mapping is a visual method that could be used to gather basic information about the field site. It is a methodology that is developed with a group. A group discussion is held in order to agree upon the main criteria that should be evaluated and after that those criteria are symbolised on a map drawn by the group (Mikkelsen, 2005: 88-89)

Seasonal calendar

Seasonal calendar is a method used to get data on the variations there are in an informant and the village's daily life, traditions etc. throughout a year. The method can especially be useful when the fieldwork is conducted in a short period of time in order to get an understanding of the changes there are in the different seasons because it cannot be experienced. Seasonal calendar gives a broader understanding of the data conducted and clarifies the differences there are throughout the year (Mikkelsen 2005: 92).

Appendix 2 - Time schedule



Objective	Research questions	Sub-questions	Data required	Methods used	Equipment
To study the changes in accessibility and its influence on the livelihood strategies for villagers in Engkeranji, Sarawak.	1. How has the roads establishment in 2010 had an impact on the Engkeranji villagers livelihood strategies?	1.1. How was the villagers livelihood before and after the establishment of the road?	The villagers livelihoods before and after the road	PRA mapping & time lines SSI Questionnaire	A big map Paper Camera Pen/marker Paper
	2. How is the Engkeranji's agricultural practices influenced by the accessibility to the villages?	2.1. What are the changes and differences in the agricultural practices in the villages?	Records of the main agricultural practices and its changes throughout the seasons. Differences between the villagers activities and their changes through time.	GPS mapping Questionnaire SSI Seasonal calendar Soil sampling	GPS Dictaphone/recorder Pen/pencil and big and small paper Marker Camera
	3. What influence does the river have as a form of transportation on the land use and fishing in the villages?	2.2. How has the road been affecting the development of agricultural practices? 3.1. What opportunities does fishing create for the villagers?	Records of the main agricultural practices (before and after 2010) Use of transport by river Fishing activities	SSI Questionnaire SSI Participant observation Water sampling GPS mapping	Pen / marker and paper Recorder Camera Recorder Pen / marker & paper Camera
	4. How has the development of the road to Engkeranji influenced the rural-urban mobility?	3.2. How are floods affecting the villagers? 4.1. How does the rural-urban mobility affect the villagers economy and farming?	Records of flooding events The floods influence on the villagers livelihood Transport facilities Income security	PRA mapping GPS mapping Focus group Questionnaire SSI	A big map Pen/pencil and paper Camera
		4.2. How does the access to education impact the rural-urban linkages?	Villagers educational level Amount of young people moving for getting a higher education	SSI	Pen/pencil and paper Camera
		4.3. What are the differences between the families investment patterns of the remittances?	Mobility periods Income from the rural-urban migrant families investment patterns of the remittances	Focus group Questionnaire SSI	Pen and paper Recorder
	5. How has the Engkeranji's livelihood been influenced by the National Park establishment?	5.1. What are the Engkeranji inhabitants opinion of the establishment of the National Park?	National Park limitation Possible turistik objectives Future income possibility	SSI Questionnaire	Pen/pencil and paper Camera

Appendix 3 - Questionarie draft

General information just for us to fill out:

GPS-point: Lat(x): _____ Long (y): _____ Height(z): _____	Interviewer:
Sub-location:	Group number:
Note taker:	Translator:
Picture	Date and time:

Notes:

Hello our names are ____ & _____. We are with a university in Denmark and UNIMAS

University in Kuching making a field study here in this village. We are researching how the road and river influences your daily lives as for example what kind of changes there have been in your lives since the road has been established.

We would like to ask if you would participate in a questionnaire that we have made. You will be anonymous and the questionnaire will only take about ?? minutes to answer.

1. Name: _____
2. (Gender: Female _____ Male _____)
3. How old are you (What year were you born)? _____
4. Marital status:
 - a) Single _____ b) In a relationship _____ c) Married _____ d) Divorced _____ e) other _____
5. What is your status in the household?
 - a) _____
6. Who are members of this household?

Relationship	Age	Gender	Job(s)	Does he/she permanently live here now?	How often does he/she work on the farm
1)					
2)					
3)					
4)					
5)					
6)					
7)					
8)					
9)					

7. Occupation (find the appropriate categories when being in the field)
- a) Student
 - b) Farmer
 - c) Works in the city
 - d) Takes care of the household
 - e) Other
8. What is the highest level of education that you have finished? (Find appropriate categories when being in the field)
- a) No education
 - b) Primary school
 - c) Secondary school
 - d) College
 - e) University
9. What crops do you have?
- a) Pepper
 - b) Rice
 - c) Rubber
 - d) (Oil palm)
 - e) Fishing
 - f) Other _____
10. What crops did you have before the road was established in 2010?
- a) Pepper
 - b) Rice
 - c) Rubber
 - d) (Oil palm)
 - e) Fishing
 - f) Other _____

11. Which of your crops are cash-crops? (consider ranking them)
- a) Pepper
 - b) Rice
 - c) Rubber
 - d) (Oil palm)
 - e) Fishing
 - f) Other _____
12. What are the reasons for the cash-crops you have chosen to grow now? (edit the categories when being in the field)
- a) The road
 - b) Less labour force – (some of the family members work in the city)
 - c) Problems with flooding – growing more resilient crops towards water
 - d) Highest price for this crop
13. How many members of your family works in the city and support your family/household financially? (Consider that some might be in school but not work?? What then)
- Number of people _____
14. Who in your family/household works in the city?
- a) _____
 - b) _____
 - c) _____
 - d) _____
15. How often are these members of the family/household home in the village (average if there is more than one)?
- a) 0-5 times a year
 - b) 6-10 times a year
 - c) 11-15 times a year
 - d) 16-20 times a year
 - e) More than 20 times a year

16. Does the members of the family who work in the city come home and help you in the harvest season? (make this question open)
- a) Yes
 - b) No
 - c) Partially
 - d) Some years
 - e) Other
17. How has the establishment of the Gunung Lesung National Park influenced you?
- a) Decrease possibility of access to resources in that area
 - b) Improves the eco tourism which benefits me financially
 - c) Cannot expand my land because of the national park boundaries
 - d) No influence
 - e) Other _____ (find more categorize that can be relevant when being in the field?)
18. Has your income changed with the establishment of the road in 2010?
- a) Yes - positively
 - b) Yes - negatively
 - c) My income is the same as before the road
 - d) Other _____
19. What is the main reason for your change in income (if there is a change)? OR
What is your primary income (rank three in a order)?
- a) Rural-urban migration/one in the household works in the city and sends money home
 - b) Tourism
 - c) Higher prices for the crop that i sell
 - d) Improved road makes it easier to sell cash-crops
 - e) The logging company has closed so does not have in income from working there any more.

20. What do you primarily spend the remittance you receive on? (find appropriate categories when being in the field)
- a) Luxury goods
 - b) Improving the house e.g. new roof
 - c) Food
 - d) Other _____

Thank you for participating in the questionnaire, we really appreciate it.

(If the informant is interesting for our research then ask: Will it be alright if we might contact you again for further questioning? Can we have a phone number to text or call you?)

Appendix 4 - Interview Guideline draft

We have made a broad interview guideline where different topics are being covered. It is not intended that all of these questions will be answered during one interview but meant to cover different interests which we can ask in an interview.

- 1. How was the villagers livelihood before and after the establishment of the road?**
2. Do you think that the road improve the living “mode” in the village?
3. Is it easier to go to the market now than before?
4. Have more villagers bought cars\mopeds after the road has been made?
5. Are there still many boat owners in village?

- 6. What are the changes and differences in the agricultural practices in the villages?**
7. What crops did you cultivate before the roads establishment?
8. What crops do you cultivate now?
9. Did you change any crops after the road have been made?
10. Have you cultivated new crop (cash crop) after the roads establishment?
11. Do you cultivate more or less cash crops today compared to before the roads establishment?

- 12. How has the road affected the agricultural practices development since 2010**
13. Do you sell more crops to the market now?
14. *Do you changed your crops practice e.g. from monocrop to multicrops annual?*
15. Have changed your crops from annual crops to perennial crops?
16. What are the reasons?

- 17. How do the river influence the land use and fishing in the village?**
18. Have you moved your rice plots from swamp areas because of e.g. floodings and\or problems with crocodiles?
19. Do you still transport crops by the river?
20. How often do you go fishing?
21. Is the rice yield higher in the swampy areas than in the hill areas?

- 22. What are the changes, before and after, the logging activities?**
23. Did you work for the logging company?
24. Did you have free access to the road in\out of the village during the logging activities?
25. Were there more people in the village during the logging period?
26. It is better to use the road for transport than the river?

- 27. What is the schools influence on the rural-urban migration?**

28. Do you know how many kids go to school in this village?
29. Your children go to school?
30. In the village or city?
31. Do you know if the young people after they finish the school in the cities come back?

32. **What are the differences and similarities between the rural-urban migrants and their families livelihood strategies?**
33. How often do the people come back from the cities?
34. How long time do they stay in the village?
35. For how long time are they away from the village?
36. Do they come and invest money (e.g. agriculture or off-farm activities) in the village?
37. Do they send money home for their families?
38. Have many people moved into cities and not come back?

39. **How can the potentiality of the eco-tourism industry influence the villagers livelihood strategies?**
40. Are there any possible touristic objectives around the village?
41. Does any tourists come to visit the village after the park have been made in 2013?
42. Could there be any touristic facilities in the village? E.g. accommodation, info tourist.

43. **What effects can the accessibility to Engkeranji have on the eco-tourism industry in the area?**
44. Do you think more tourists would come to the village if the road conditions was better?
45. Is it possible to make river trips on a boat in the village?

46. **How has the Engkeranji's livelihood been influenced by the National Park establishment?**
47. Have you change the way you've made agriculture after the park was made?
48. Have the park had taken out land from villagers?
49. Do you have any restrictions now to go in the park and e.g. collect fruits, firewood?
50. Do you have restrictions for hunting?
51. Did your animal graz in the park?
52. Do they still graz in the park?

