Yet another scheme

A study of the influence of government schemes on the livelihoods of households in Entebar, Sarawak

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Abstract

Governmental land and agricultural development schemes in Sarawak have been critically examined in previous literature. Private-public partnerships are said to undermine local communities needs, while agricultural schemes are suspected of being misdirected and not addressing the rural populations challenges. The aim of this report, is to explore how government schemes and other initiatives influence the livelihood strategies of households in the Iban longhouse community, Entebar. We conclude that we have not found clear evidence that government schemes influences or increase the overall sustainability of all households in Entebar. Ultimately the different livelihood strategies identified are depended on other income sources, pension and remittances, than the agricultural activities supported by schemes, which lead us to conclude that the schemes and initiatives may not address the current concerns and challenges of the villagers of Entebar in terms of their livelihoods.

Acknowledgements

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Abbreviations

AFC:	Asian Financial Crisis
DW:	Filtered Water
DOA:	Department of Agriculture
DOAS:	Department of Agriculture Sarawak
FRA:	Forest Resource Assessment
GF:	Gravity Feed
HBVCIP:	Holistic Bamboo Value Chain Investment Project
HH:	Household
HM:	Headman
MPB:	Malaysian Pepper Board
MPOB:	Malaysian Oil Palm Board
NAP:	National Agricultural Policy
NCL:	Native Customary Land
NCR:	Native Customary Rights
NTFPs:	Non-Timber Forest Products
PRA:	Participatory Rural Appraisal
RISDA:	Rubber Industries Smallholders Development Authority
SBPKP:	Federal Government Paddy Fertilizer Scheme *(Skim Baja Padi Kerajaan Persekutuan)*
SIPP:	Paddy Production Incentive Scheme (Skim Insentif Pengeluaran Padi)
SLC:	Sarawak Land Code
SOP:	Sarawak Oil Palm
SSI:	Semi-structured Interview
STBL:	New Pepper Planting Scheme (*Skim Tanaman Baharu Lada)*
WHO:	World Health Organization

Content of report

1. Introduction

Since the wake of market liberalization in the late 1970's, the rural landscape of Sarawak, Malaysia has largely been shaped by various agricultural interventions with an overall aim of facilitating a socio-economic transformation in rural livelihoods (Cramb, 1988; Ngidang, 1995). Rural household communities are included in various land and agricultural development strategies through the form of agricultural schemes for smallholders and private-public partnerships (Ngidang, 2002; Dardak, 2015). Malaysia's current agricultural development policy is shaped by two main objectives. One of them being to protect smallholders and increase the level of self-sufficiency and well-being among the rural population (Dardak, 2015; Ngidang 1995). And the other being to increase the national output of commodity goods, such as pepper, oil palm and rubber to become a competitive player on the world market (Solaymani, Aghamohammadi, Falahati, Sharafi & Kari, 2019; Yong, 2019). Both, private-public partnerships in the forms of joint-ventures, and smallholder development schemes, have been problematized, and argued to often be misdirected (Ngidang, 2002; Perera, 2009). Further, Government interventions in the form of subsidies have been discussed as resulting in a "*subsidy-syndrome*" among Sarawakian households, where recipients are rather dependent on government inputs than becoming self-reliant (Ngidang, 2005).

Kumpang Entebar, an Iban longhouse community in Sarawak, is characterized by a large share of households receiving support from a variety of government smallholder schemes, while also being part of a joint-venture project with an oil palm company, the *Sarawak Oil Palm* (SOP). As of now, another actor is entering the field: The *Holistic Bamboo Value Chain Investment Project* (HBVCIP). A project, which is in its starting blocks and expected to be implemented by the end of 2020. This makes Entebar an interesting case for an exploration of different government interventions targeting rural households in the form of private-public partnerships (joint-ventures) and subsidy schemes. Following this, we find it interesting to investigate how schemes and other initiatives are currently influencing livelihoods of the households of Entebar. In order to do so, we take our point of departure in the Sustainable Livelihood framework as formulated by Scoones (1998), who suggests that the livelihoods of different households should be analysed through their strategies and the combinations of capitals; being financial, human, social or natural, that these require.

A livelihood is considered sustainable when it 'can cope with and recover from stress and shocks, maintain or enhance its capabilities and assets, while not undermining the natural resource base' (Scoones, 1998, p.5). Following this definition, the aim of this report, is to explore how schemes and other initiatives influence the livelihood strategies of households in Entebar. We will focus in three overall questions:

1) *What characterizes the current livelihood portfolios in Entebar?*

2) *What agricultural schemes and other initiatives are present in Entebar, and how do households navigate them and their benefits?*

3) *What factors determine whether or not households have access to and chose to engage in schemes and other initiatives?*

In answering these questions, the report is structured as follows. The succeeding section presents a background on the land tenure system in Sarawak, as well as brief review of the development of agricultural policies in Malaysia, followed by a site description of Enetbar. In the second section of the paper, our methodology will be outlined. Following this, the next sections will first provide an overview of livelihood activities identified in Entebar, and a characterization of three archetypes of livelihood portfolios and their capital. Second, the different schemes and other initiatives will be outlined and discussed in relation to factors determining if households participate in them. Third, a broader discussion of our overall findings will be placed in a context of other literature. The last section will provide our main methodological considerations and outline limitations we have faced during our fieldwork.

1.1. Background

Any analysis of governmental interventions, or private-sector projects in rural communities cannot take place without an understanding of the historical context in which they have developed. The following section will outline the development of Malaysia's agricultural policies, with a focus on Sarawak and the different interventions implemented. Before entering into a description of the agricultural policy development in Malaysia, an explanation of the land tenure system in Sarawak is needed.

Land tenure systems in Sarawak

The traditional land tenure system in Sarawak is based on customary law among native communities, and has existed long before Sarawak was under the Sultanate of Brunei (Ngidang, 2005). *Native Customary Land* (NCL) is derived from traditional ways of occupying and using land, notably from shifting cultivation (Cramb, 2012). For NCL the principal claimants of land are Dayaks, such as Iban, Bidayuh, and other ethnicities (Cramb 2012). During the rule of James Brooke a dualistic economy was shaped, with commercial agricultural and mining for the Chinese immigrants and a subsistence economy for the natives. At this point, two different land tenure systems existed side-by-side through the concept of legal pluralism (Ngidang, 2005). One being the customary land system, the Adat[1], and the other a codified land system, which made private land ownership legal and thereby facilitated the commercialization of agriculture in Sarawak (Ngidang, 2005).

The current legislation of land rights is based on the Sarawak Land Code (SLC) from 1958. It has been modified throughout the years but in its essence the legislation deals with land registration, settlement of customary rights, alienation and land acquisition in Sarawak (Ngidang, 2005). Land in Sarawak is classified by various types of land[2]. In the SLC, customary rights to land can only be recognized if such rights were created prior to January 1st, 1958. Today, NCR land covers various combinations of private and common property rights within an overarching framework of community or longhouse governance, which can be surveyed and titled (Cramb 2012).

History and development of agricultural policies in Sarawak

In Sarawak, smallholders produce both commodity crops for export, such as rubber, palm oil and pepper; and food crops for the domestic market, such as rice, fruits, vegetables, and fish (Rosli, Radam & Rahim; 2013; Yong, 2019). As part of the *National Agricultural Policies* (NAP) both of these have been highly regulated (Dardak, 2015).

Throughout the past decades the NAPs have been shaped by objectives of meeting both domestic and global market demands. The NAP 1 was formulated in 1984 as a response to the stagnation in the agricultural sector in the 1980s, and led to a focus shift towards market liberalization and agricultural commercialization.

[1] The Adat system: a system, which is used for regulating traditional land use and farming systems among natives by managing human relations (Ngidang, 2005).

[2] See also Appendix C.

This policy focused on the development of new land areas for agriculture through the approach of private-public partnerships in the form of joint-ventures (Cramb & Sujang, 2013; Dardak, 2015). In contrast, the following policy, NAP 2 (1992), focused largely on the role of smallholders in the export-crop production, recognizing their importance in gaining a more competitive Malaysian export sector (Lucas & Verry, 2016). The implementation and revision of schemes and a broad development of the infrastructure was ought to increase smallholder productivity and wellbeing (Dardak, 2015). However, as a direct response to the Asian Financial Crisis in 1997, the NAP 3 (1998), had a larger emphasis on supporting national self-sufficiency and smallholder food production, such as rice cultivation (Dardak, 2015; Ramli, Shamsudin, Mohamed & Radam, 2012).

Introduced in 2011, the aim of the current agricultural policy (NAP 4) is to create a more dynamic agricultural sector that is competitive on the global market, while ensuring food security and increased well-being of rural communities (Dardak, 2015; Ramli et al., 2012). A range of different agricultural activities are supported in the form of specific *subsidy* (e.g. *Federal Government Paddy Fertilizer Scheme)* or *planting schemes* (e.g. RISDA *Replanting Scheme*). Whereas the *planting schemes* are assisting smallholders on a broader time scale (from planting until harvesting), *subsidy schemes* provide support in the form material inputs, such as fertilizer or pesticides (Ngidang, 1995; Ramli et al., 2012).

Alongside was the breakthrough of private-public partnerships in 1994 with the implementation of the land development policy, *Konsep Baru*, which encouraged smallholders in Sarawak to lease parts of their NCR land to large-scale plantations run by private companies, in the form of joint-ventures (Cramb, 2012). The aim of the policy was to include the Dayaks into the mainstream economic development, by making them shareholders in oil palm companies by leasing and working on their land on a joint-venture basis (Cooke, 2006).

Today, both joint-ventures and individual smallholders are present in Sarawak's agriculture sector, contributing to the overarching goal of the NAP 4 in becoming a dynamic and competitive sector, which is able to withstand local and global shocks (Cramb, 2012; Ramli et al., 2012; Dardak, 2015).

1.2. Site description

Kumpang Entebar is a community located along a river of the same name in the district of Sri Aman close to the Indonesian border (Image 1). Originally located elsewhere, the longhouse was moved to its current location in 1963[3]. The community itself resides in two seperate buildings and six individual houses, and as of March 2020, a total of 26 households live in Entebar.

Image 1. Location of Entebar in Sarawak and close up picture.

Entebar is located adjacent to the village of Batu Lintang, which is one of the major hubs in the area. Batu Lintang has several small shops along the road, a church, another longhouse community, as well as a primary and secondary school. Further, Entebar is located nearby a concrete road which was built more than 40 years ago[4]. Located on the outskirts of a mountain range, the surrounding landscape is characterized by a mixture of cultivated land, fallows and secondary forest. With an average precipitation of 3.331 mm/year and an average temperature of 27°C, the climate is classified as *Af*[5], or tropical rainforest climate (Climate Data, 2020).

[3] Information based on SSI with the Headman, March 2020.
[4] Information based on SSI with the Headman, March 2020.
[5] Köppen-Geiger classification: the main climate is equatorial (A) and precipitation is fully humid (f) (Climate Data, 2020).

2. Methodology

Our fieldwork in Entebar was conducted over a period of 12 days in February/March 2020 (Figure 1). In preparation for the fieldwork, we spent approximately three weeks exploring existing literature and designing our research project in terms of overall research objectives and the methods required for answering these. Our research process in Entebar and use of methods can be categorized into different phases: 1) *the exploratory phase*, building up relationships with our counterparts, exploring the area and visiting different farms, and designing questionnaires; 2) *the relationship building phase*, getting in depth knowledge through informal conversations and socializing; 3) *the data collecting phase*, using collected data from the survey and informal interviews to identify informants and gatekeepers to participate in the conduction of the different methods; and 4) *the analytical phase*, exploring preliminary findings and presenting them to the villagers.

The figure below draws a timeline of the work we did during our fieldwork.

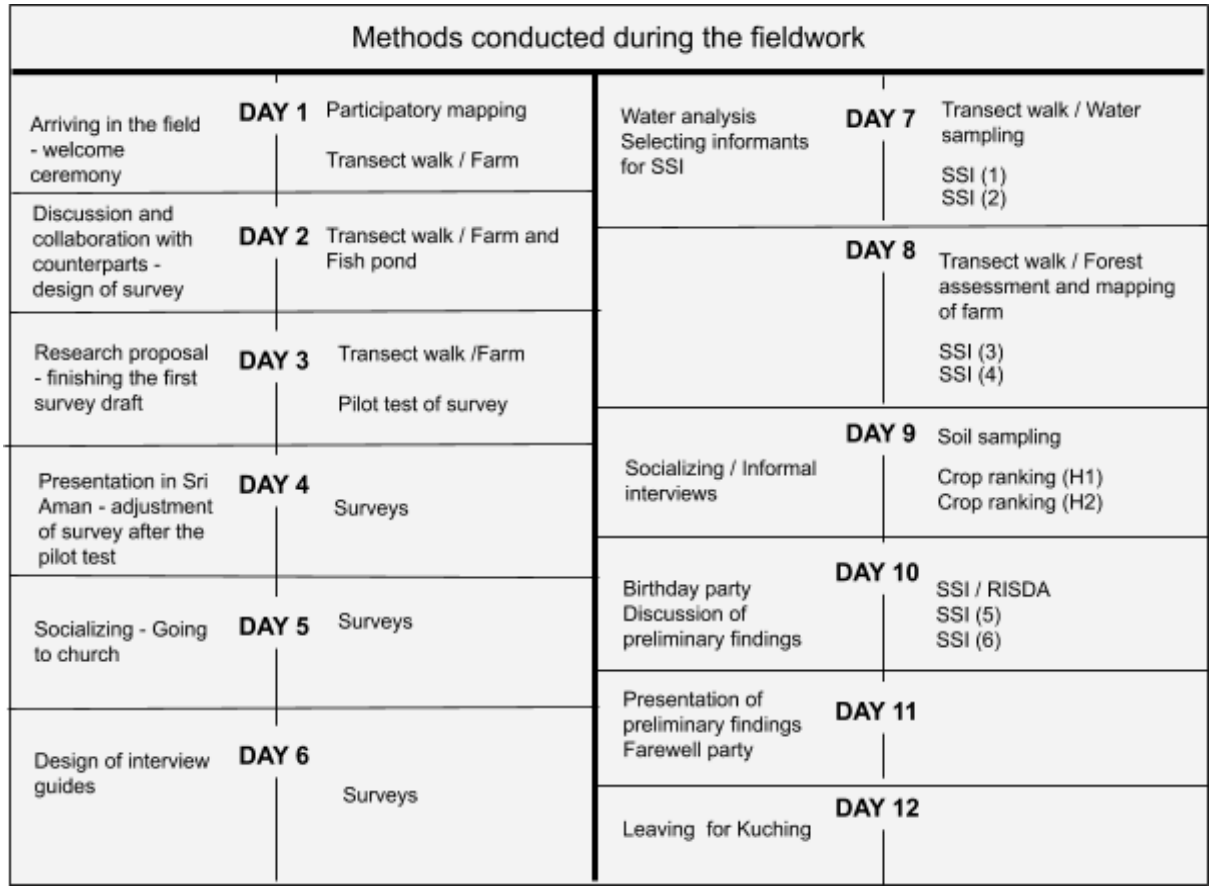


Figure 1. Timeline of the fieldwork.

2.1. Gaining access to our field

When engaging with people, each situation differs from one another, which is why access to the people in the fieldsite is considered a dynamic and context specific issue (Feldman, 2003). This speaks to our experience in Entebar, as access needed to be obtained, negotiated, and navigated throughout our entire field work.

It became obvious, when pursuing respondents for our questionnaires in the beginning of the fieldwork, that even though our access to the fieldsite was negotiated and fixed on our behalf, we were not necessarily in the position of having the access to all aspects of the field[6]. An example of this was that one of the villagers we approached in the first days of our work did not want to participate in the survey, whereas later gladly agreed to participate.

Though aware of the importance of building relationships with people we wanted to talk to, challenges like language barriers and getting familiar with the different social settings and what was expected of us, influenced our access, especially during the first days. We experienced it as challenging to approach villagers not living in the building we were hosted in[7], due to an initial lack of interaction between them and us. On the fifth day in the field the crucial turning-point came through the help of one of our supervisors. He facilitated the contact to the people living in the other building and we could carry on with our research. Through informal conversations and observations, and by asking informal and formal[8] questions about schemes and benefits, we managed to obtain a variety of data and perspectives relevant for our research objective.

2.2. Data collection methods

We conducted a range of different social and natural science methods in order to obtain both qualitative and quantitative data relating to our research questions. The following sections provide a description of how and why we conducted the different methods.

2.2.1. Questionnaires

Within the first week of our fieldwork we conducted 22 household surveys. Our objective was to obtain quantitative, corresponding data regarding households, their livelihood

[6] In this context, aspects of the field is referring to the people, surroundings, knowledge, perceptions, ect. related to our research objectives.

[7] Members of the community living in the west building and the individual houses.

[8] Formal is referring to SSI, the Survey and the Crop Ranking sessions.

strategies and agricultural activities. Our focal point was related to households rather than individuals, thus we decided to carry out one survey per household, carrying out a census sampling of each household. In order to secure a consistent respondent selection method, we prioritised surveying the head of the household, if possible.

However, while conducting the questionnaires other family members were frequently present and contributed with information. Out of the 27 bileks in Entebar, five bileks were either vacant or occupied by households, who were not available during the period of our fieldwork.

The questionnaires were formulated and designed within the first few days of our fieldwork. As we were still new to the area and not yet sure of the direction of our research, we decided to focus on three broad themes: 1) *household characteristics and assets*, 2) *agricultural activities*, and 3) *land ownership*. In order to generate corresponding data, we mainly formulated closed-ended questions with a fixed amount of possible responses. However, we were aware of the possibility that our respondents would not always fit into any of the predefined categories, and therefore we added an open-ended 'other' option.

Before conducting the surveys, we did a pilot test with both our interpreters present. Afterwards we incorporated their and our own concerns into the final survey. The final survey was carried out by one interviewer, one notetaker/observer and one interpreter, who translated from English to Iban and vice versa.

2.2.2. Semi-structured interviews

In the last week of our fieldwork, we conducted eight semi-structured interviews (SSI). A semi-structured interview can be used to explore different ideas or themes with participants with the help of a interview guide, including themes and questions (O'reilly, 2012). We conducted our semi-structured interviews with the purpose of obtaining more in depth information about people's perception of their 1) agricultural activities, 2) government interventions (schemes and private-public projects), 3) the land-system, and 4) their life in the longhouse. Interview-guides were prepared before each interview and had a combination of broad and specific questions structured under these four themes.

With a focus on livelihood strategies in Entebar, we interviewed a younger villager who works outside of Entebar. We wanted to investigate her perception of migration, the longhouse and its future. We also interviewed the headman in order to get a deeper understanding of the longhouse structure, both as a concept, but also about Entebar and its history. As schemes play a central role in our research questions, we also interviewed the

headman about his farming activities and participation in schemes. Besides him, we carried out four semi-structured interviews with farmers. Our aim with these interviews was to gain a deeper understanding of their livelihood portfolios, but also to investigate their perception of schemes and their land. The four farmers were chosen from three overall criteria: 1) *Scheme participation,* we chose a mix of farmers who are either participating in a scheme, getting other governmental support or is not participating in anything/getting any support; 2) *land titles*, we chose a mix of farmers who either do not have titled land or have both titled and untitled land; and 3) *Other perspectives,* in order to get more perspectives represented in our data, we chose to interview farmers from both buildings (east and west).

Additionally, we carried out an interview with RISDA. As most of our information about schemes had been obtained from people in Entebar, we wanted to strengthen the validity of our data with triangulation, by asking RISDA the same questions as we had already asked farmers in Entebar. Furthermore, we interviewed RISDA to explore how they articulate their objectives, and how they perceive the reality of farmers, and how the scheme impacts their farming activities. Finally, an interview was conducted with a villager who works as a magistrate at the Native Court to gain more information about Native Customary Land.

2.2.3. Participatory observation and informal interviews

Participant observation relies on visual and verbal data but also allows for eliciting other kinds of perceptual and embodied knowledge, as well as generating questions for follow up interviews (Konopinski 2014). We used this method to obtain knowledge on agricultural practises, social relations and perceptions of schemes, which can only be obtained through observation and participation. Observing and participating by joining farmers in the field, for instance, opened up for questions we would have not come up with in other settings, such as: "why do you not harvest this pepper?". Furthermore, visual data was added through this method, broadening our understanding of certain agricultural activities. Embodied and perceptual knowledge obtained by observing how the farmers move around in the field, their daily routines, different tools used for different practises, gave us an idea of the labour intensity of the different agricultural practises, as well as farmers' understanding of how to cultivate and process each crop in the best manner. These types of data on agricultural activities, combined with data obtained through participating in social gatherings, allowed for a variety of data which made it possible to understand the context of our research, also adding and generating questions for follow up interviews taking place in a more focused setting.

2.2.4. Participatory Rural Appraisal (PRA)

Participatory Rural Appraisal (PRA) is an array of techniques and methods used to learn from and with informants through participation (Brockington & Sullivan, 2003). In our fieldwork we used two PRA techniques, namely *matrix ranking* and *transect walks*, with the purpose of learning from our informants in a setting where they determined the direction of the discussion.

Crop Ranking

Matrix ranking is a technique where chosen informants are asked to rank a list of certain items on a matrix of several predefined scales. In our case, we wanted to understand how different agricultural activities would be ranked in terms of different aspects. The aspects were: "demand for labour", "demand for fertilizer", "vulnerability to pests and diseases", and "price stability". In order to secure that the questions were clear in their formulation, they were formulated in cooperation with our interpreters. Afterwards, they were written on a paperboard in Iban (Image 2).

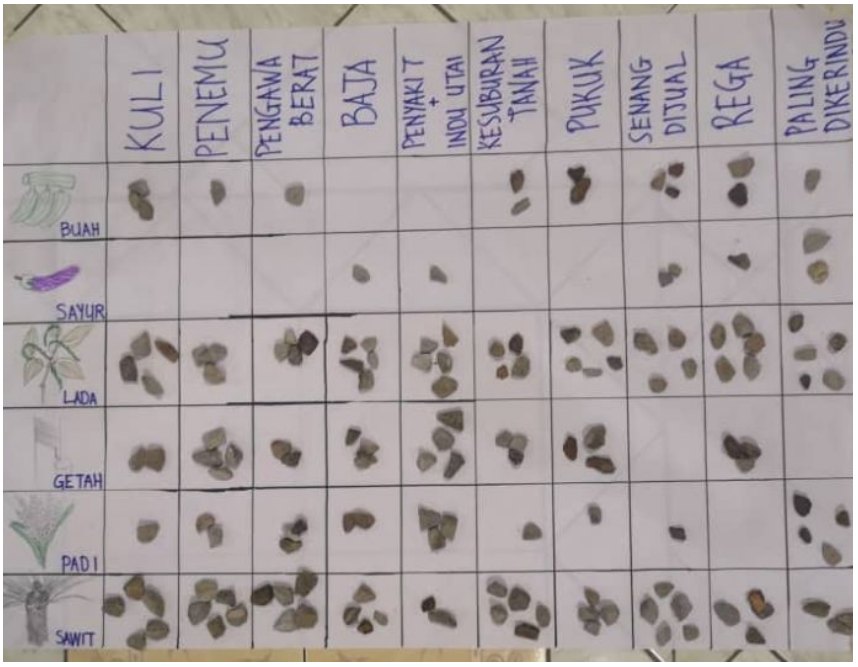


Image 2. Board from ranking session in Entebar.

We carried out two ranking sessions simultaneously in both buildings, with five participants each. One facilitator, one translator and two observers were present. We carried out two, to cover a broad spectrum of farmers, but were aware that it could easily be overwhelming to

have more than five participants at one ranking. The two sessions were divided into: 1) a session with farmers who receive a government pension, and 2) a session with farmers who do not receive a government pension. The focus on government pension was related to our research question about livelihood portfolios.

We found it interesting to explore, if a group of farmers who receives a government pension would rank the activities differently than the farmers who do not.

The ranking sessions were carried out simultaneously to ensure as little interference as possible between the two groups. The ranking took place around the matrix board, where the five participants were asked to rank the activities with rocks on a scale from 0 to 5, where 0 represented the "least" and 5 the "most". The ranking session was divided into ten rounds, one per question, where the facilitator read a question, and the interpreter translated it and made sure that the question was understood in the intended way. In order to not disrupt or influence the ranking, only the participants were allowed to talk and touch the matrix during the ranking.

We found that the way the data was collected, and the comments that were made, was at least as important as the final ranking results. A part of the exercise was that participants had to discuss and agree on which crop got which ranking, which afterwards turned into a unstructured group discussion. In terms of translation, we decided not to interfere and have it directly translated, since we did not want to undermine the natural flow between the participant. Instead, we followed up on the different discussion points made by the participants afterwards with the translator. We were aware of the fact, that when producing the questions found relevant, we made certain presumptions. As a consequence, there's a probability of important factors lacking in our data. In retrospect, the matrix could have been made in collaboration with a farmer.

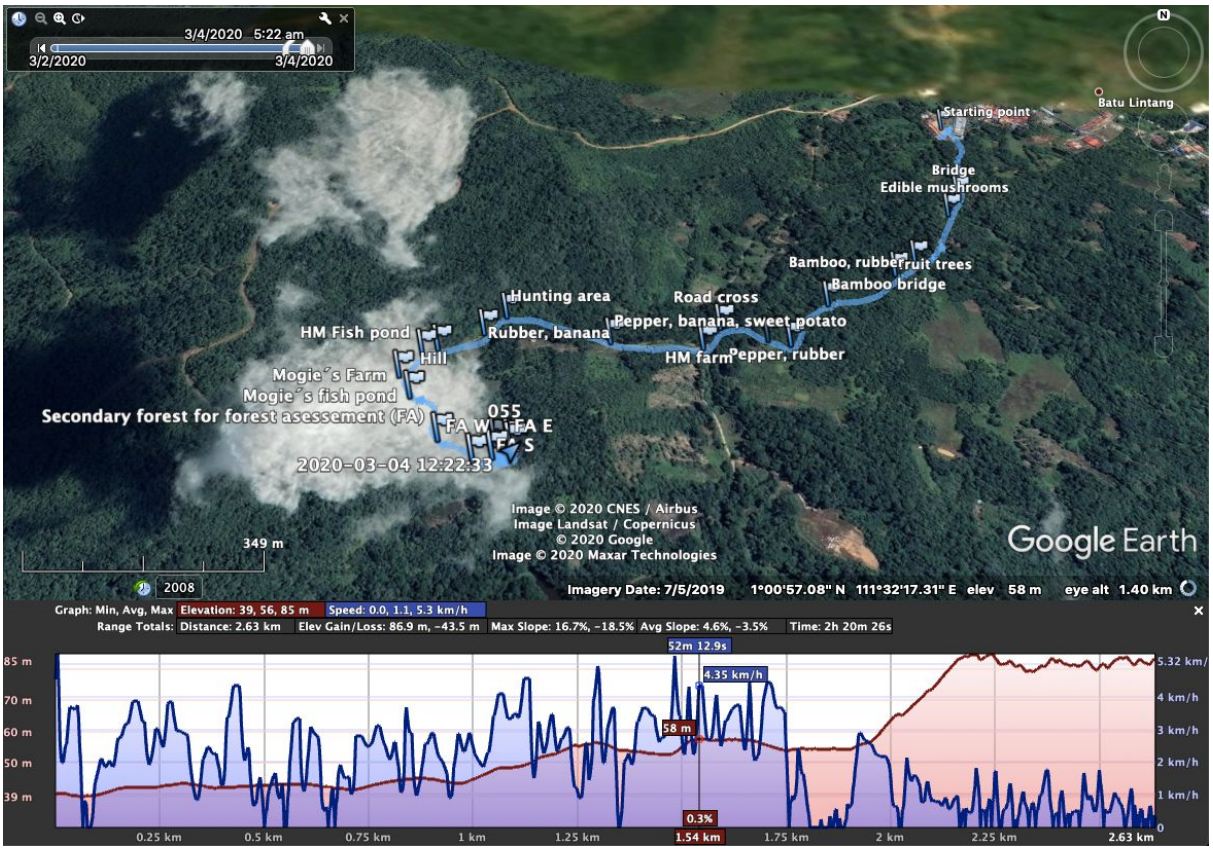
Transect walks

A transect walk is a tool for investigating the location of resources, landscape, and land uses along a given transect (FAO, 2001). We used this method to gain an understanding of the area, as well as different agricultural activities and natural resources, which provided an overview of the natural capital in the area. We did three transect walks in the beginning of our fieldwork to explore the different agricultural activities in the area. The guides were not selected by us, but rather they invited us to join them. We had three different guides showing us their farms and the area while answering our questions along the way. The premise for

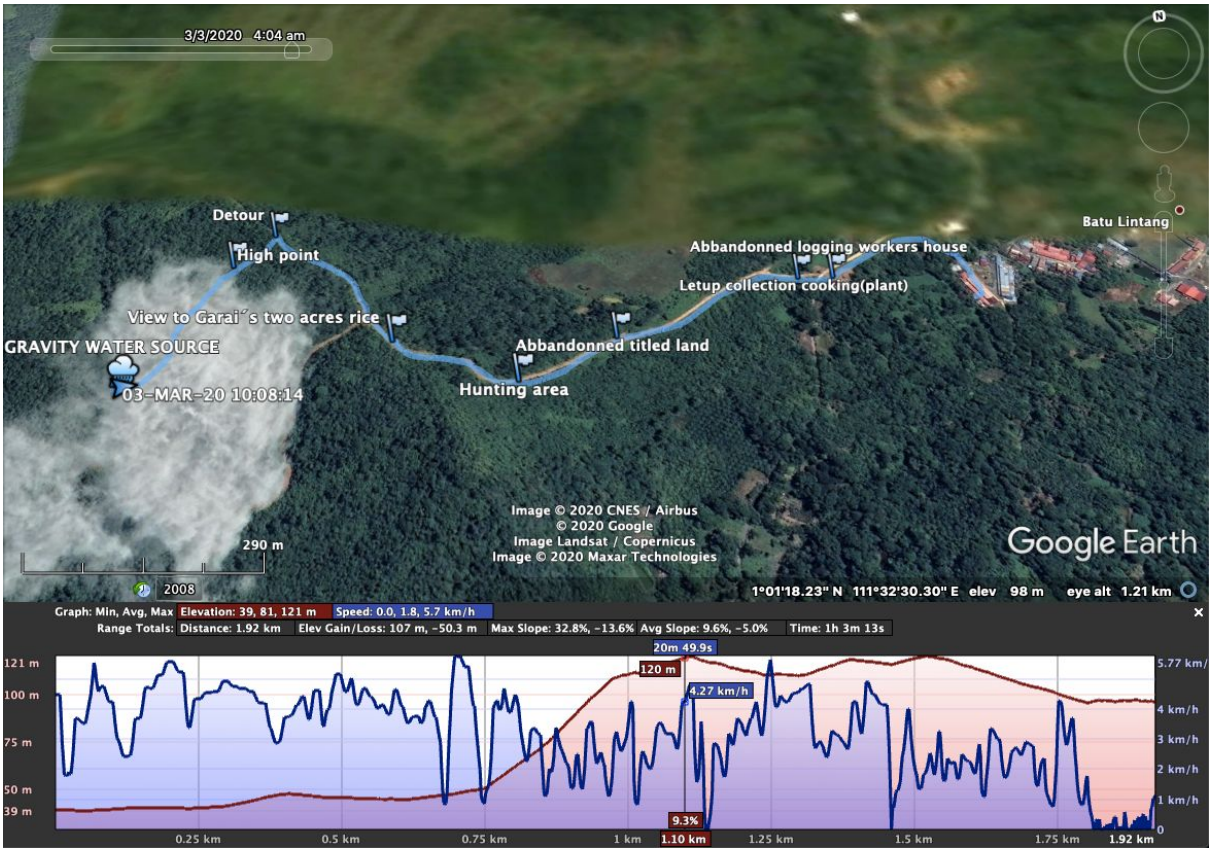
these walks was, that we went where *they* wanted to go, and we did not try change the direction. By giving us tours on their own farms and showing us how they work there, we had the chance to get a deeper understanding of the agricultural activities and practises that are part of people's livelihood portfolios.

While conducting the water sampling and forest assessment, we also took advantage of the opportunity to go on a transect walk exploring the natural resources in the area, both in terms of water resources, and the forest resource (Image 3). This data contributed to our research question on livelihood portfolios, since we obtained a deeper understanding of the natural capital in the area. The participants, our guides, pointed out relevant plots along the walk, which was GPS plotted, while asking questions in terms of the different land uses and forrest produce observed. This method also led to a mapping of a farm with diversified agricultural practices, which added to our understanding of the difference between farming practises in Entebar (Image 3).

Image 3: (Left) Mapping of a farm - (Right) Guide showing his farm



Map 1. Map of the transect walk from Entebar to the location in the secondary forest.



Map 2. Transect walk from Entebar to the gravity feed water source.

Though our approach to this method was very explorative, and the walks were mostly not well-planned, the method provided us with a good overview of the area, its resources and land uses, and we managed to obtain a lot of information regarding different agricultural practises.

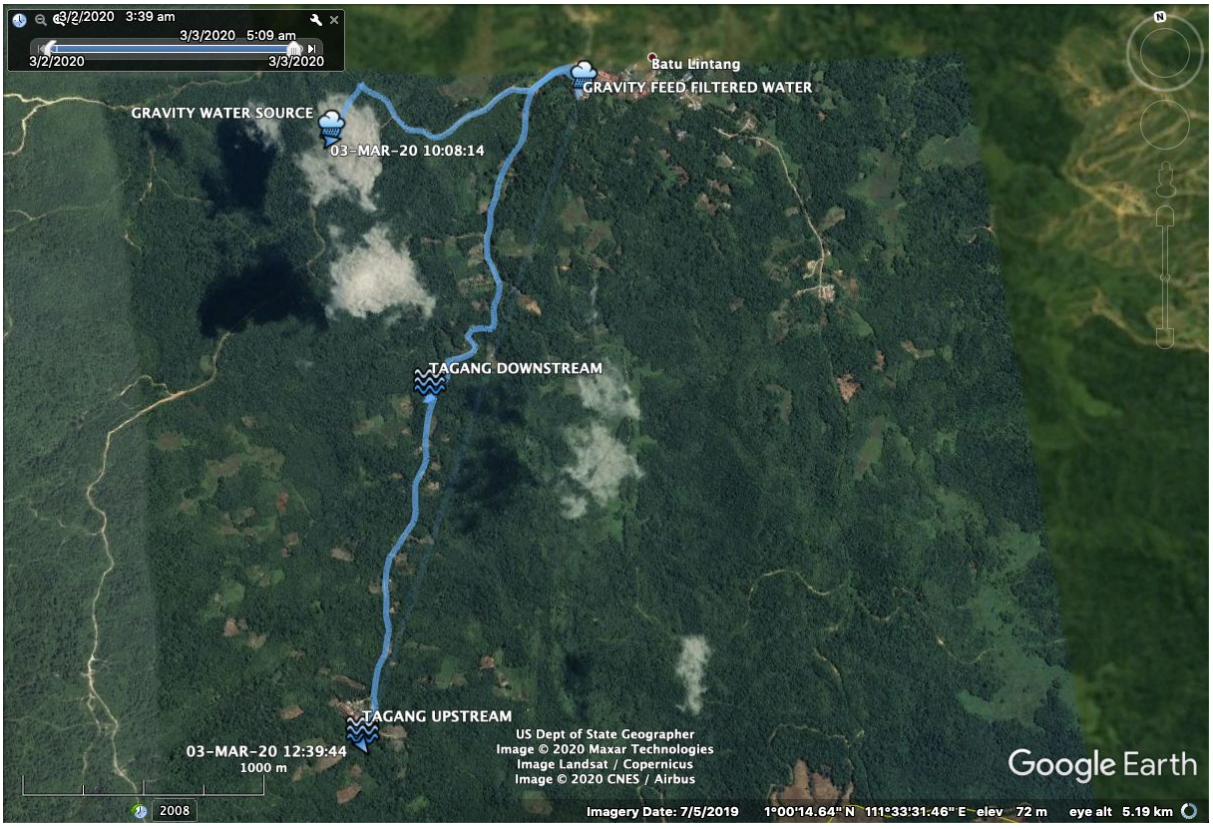
2.2.5. Water sampling

A water quality analysis can be used to measure and analyze various parameters, that's why the method can be used for a wide range of purposes (FAO, 2004). For instance, a water analysis may reveal whether or not a specific water source is suitable for certain uses, e.g. human consumption or agricultural irrigation, but it can also reveal how human activities affect the water source, e.g. through pollution from agriculture or waste management. As part of the natural capital, the quality of the water in the river in Entebar was investigated within two areas. The reason why we chose to investigate these two areas is, that concerns regarding their quality were raised by villagers in informal conversations.

The table below (Table 1) provides an overview of the different water sampling points for both the drinking water and the Tagang system.

	Location of 1st sample point	**Location of 2nd sample point**
Drinking water	Taken at gravity-fed water deposit	Taken at the Entebar water tank after water is filtered
Tagang system	Taken in the Tagang system area of the river	Taken upstream of Titing Kha

Table 1: Overview of sample locations.



Map 3. Map of the water sampling locations

Drinking water

The quality of the drinking water source was chosen, because access to clean drinking water is directly linked to the health and well-being of people, which is related to the human capital (UN, 2013). We decided to assess the quality of water used for human consumption after listening to the villagers concerns regarding drinking water. We did this by conducting water samples at two different points, analyzing chemical parameters such as Temperature, Dissolved Oxygen, Chemical Oxygen Demand, Salinity, Turbidity, pH, Phosphate (PO_4^{3-}), Ammoniacal Nitrogen and Total Suspended Solids. Afterwards, we compared the parameters obtained with the "Raw Quality Drinking Standards" provided by the Malaysian Ministry of Health[9]. We decided not to conduct biological measures for the latter, as human pathogens (bacteria and protozoa) are being removed or inactivated by boiling the water before drinking (WHO, 2011).

[9] Information provided by UNIMAS Professor Mr. Tay.

The Tagang system

As an activity involving most households in Entebar, the water quality of the Tagang system has a direct link to our analysis of government schemes in Entebar. The Tagang project is a government project, which provides villagers with fish as a source of protein[10]. We therefore found that both areas were relevant to investigate, as their quality may have implications for the livelihoods of people in Entebar. In order to assess the quality of the water in the Tagang system, we conducted two water samplings. Both chemical (same as mentioned above) and biological (Total Coliform Count and Biochemical Oxygen demand)[11] were measured. For both experiments, we made three replications and obtained the mean in order to get a more accurate number.

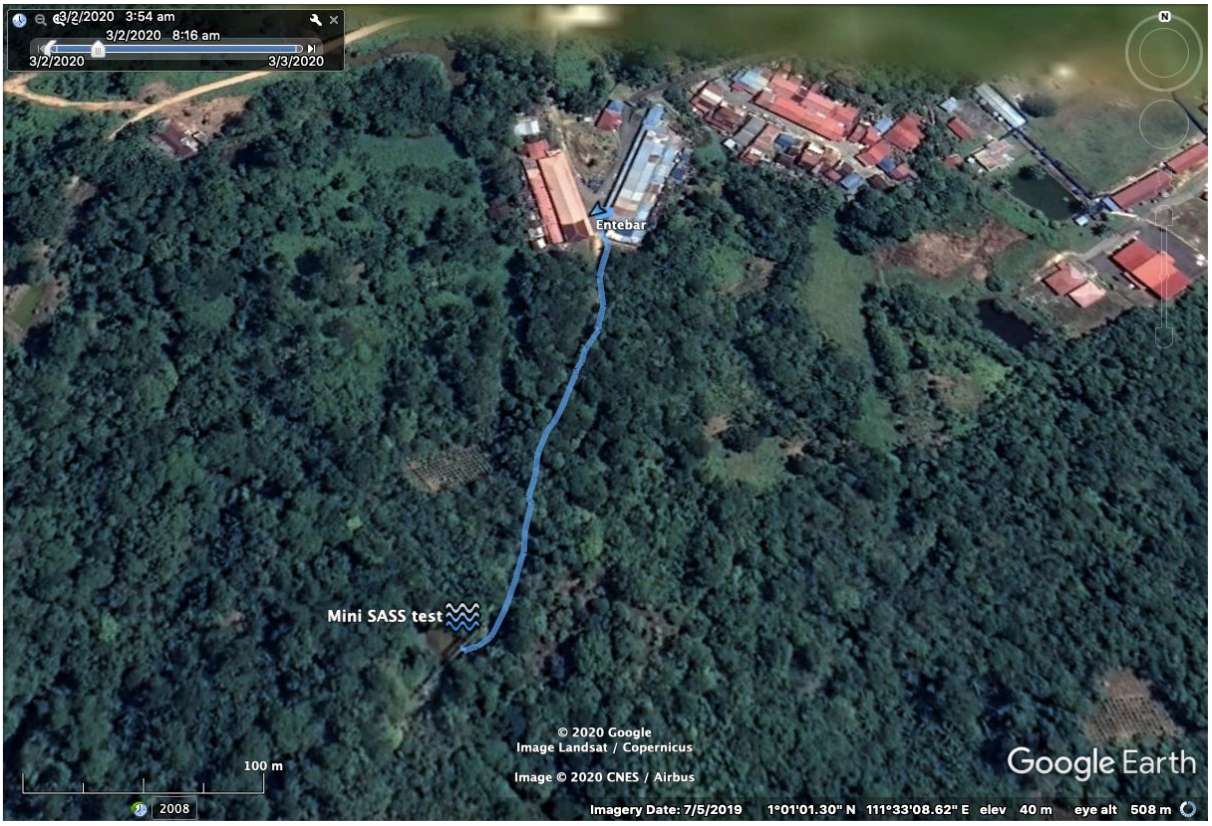
MiniSASS

MiniSASS is a method used to monitor the health of a river by studying the population of different invertebrates present in the water, based on the sensitivity of various invertebrates to water quality (Graham, Dickens & Taylor, 2004). This method can work as a useful complement to other water methods conducted in a laboratory, providing us with a more complete assessment of the water of the river as a natural capital. We initially planned to use this method as supplementary data for our chemical and biological river water analysis, with the purpose of learning more about the river where the Tagang scheme is taking place. Unfortunately, we were not able to conduct the minisass as a supplementary test, due to heavy rain and muddy conditions (Image 4). Preparing for this method we conducted a pilot test in in a walking distance from the village to Entebar river. This data is presented in our results, since it is related directly to water as natural capital of the area nearby.

Image 4. Mud preventing miniSASS test.

[10] Information from casual conversations with the villagers.

[11] The assessment of both chemical and biological parameters will provide a better understanding of the water quality (FAO, 2004).



Map 4.. Location of MiniSASS assessment.

2.2.6. Forest Resource Assessment (FRA)

We used this method to assess the forest quality through identification of the species diversity and the availability of *Non Timber Forest Products* (NTFPs). Assuming that the forest is an important livelihood source in Entebar, the aim of this method was to assess the quality of this capital. By doing this, we could attain an understanding of the forest produce available for the villagers to collect as part of their livelihood strategy. This method was conducted in a nearby secondary forest, identified by an informant.

The area selected was a random 20x20m (400 m²) plot, divided in 4 different subplots of 10x10m (100m² each)[12]. The measures taken were 1'30 cm diameter (metric tape) and height (clinometer and metric tape). We used a compass in order for the plots to aim the main cardinal directions for practical purposes.

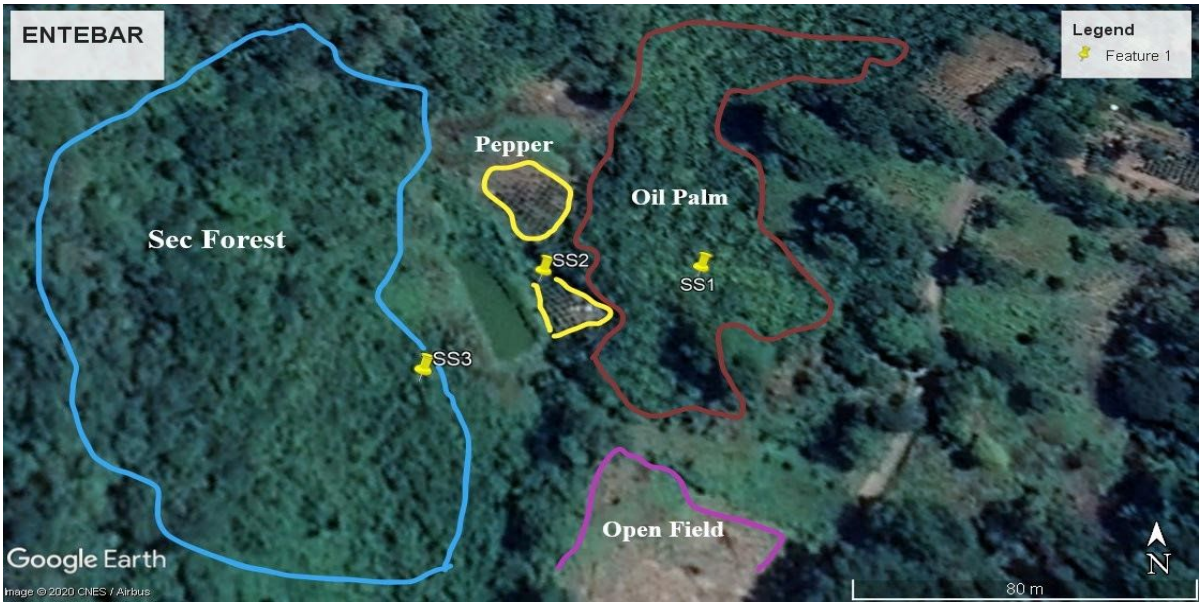
It was a tough process and time consuming, since measuring diameters is difficult in a tropical forest, and measuring the height was complicated due to the different canopy levels.

[12] The round numbers were chosen to make further calculations easier when extrapolating of the data to a wider area was needed.

2.2.7. Soil sampling

The quality of the soil available has a direct link to the livelihoods of the people of Entebar, agriculture being a prominent part of the livelihood portfolios. The purpose of conducting this method was to explore how the different crops and kinds of management affect the soil quality. Being aware that the schemes provide inputs in terms of fertilizer, we found it interesting to investigate what impact these inputs could have on the quality of the soil.

Soil samples were taken of the soil in a close area, with similar slope and soil structure on three different plots; 1) *oil palm plantation*, 2) *pepper plantation*, and 3) *secondary forest*. In each plot, three random soil samples were collected in two different depths (0-10 cm and 10-20 cm) and mixed in order to have a more representative sample.



Map 5. Map of the soil sampling plots.

The samples were marked, put in bags and eventually transported to Denmark with the idea of analyzing parameters such as Carbon: Oxygen ratio, Nitrogen, Phosphorus and Potassium (NPK) levels, Cation exchange Capacity (CEC) that could have revealed general trends in the three different plots[13].

3. Results and Discussion

This section will commence with an overview of our findings in terms of livelihood portfolios by discussing income-generating and other activities. Due to an abundance of results, the

[13] Due to external factors no analysis was possible.

findings will be discussed along the way with the help of our underlying framework, categorizing the households into specific "archetypes" (Scoones, 1998). Furthermore, the general findings will be outlined, leading into a broader discussion related to our research objective and the underlying literature.

3.1. Livelihood portfolios

In this section the different livelihood portfolios will first be discussed in terms of agricultural activities and in a succeeding section categorized according to three different archetypes.

3.1.1. Activities and incomes

The activities and incomes identified in Entebar can be grouped into the sections of "agricultural activities", "remittances", "collecting jungle products & hunting", "dividends from joint-ventures" and "other activities and incomes".

Agricultural activities

18 out of the 22 surveyed households in Entebar, covering 82% of the total households, are currently active in agricultural activities. As such we identified both food and commodity crops. All households besides one, were active in cultivating food crops, such as vegetables, fruits and rice. The respondent not cultivating any food crops, was cultivating both rubber and pepper. Besides rubber and pepper, oil palm can be identified as another commodity crop. In total, 14 households were active in cultivating some kind of commodity crop.

On average, the 18 households are involved with 4.7 different agricultural activities, with the most common cultivations being rubber, fruits, vegetables and pepper (Table 2). Whereas rubber, pepper and oil palm are solely cultivated with the purpose of generating an income, most households are both consuming fruits, fish and vegetables themselves, selling it occasionally if a surplus is available and there is a buyer[14]. Rice is mainly produced with a purpose of own consumption and is rarely sold, due to a relatively low local demand, which can be linked to the availability of cheaper, imported rice on the market[15] (Dardak, 2015).

[14] Information from SSI and Survey.
[15] Information from Crop Ranking and SSI with the Headman.

	No. of households	% of households
Rubber	14	77.8
Pepper	11	61.1
Rice	10	55.6
Oil palm	5	27.8
Fruits	16	88.9
Vegetables	12	66.7
Fish pond	10	55.6
Pig farm	2	11.1
Poultry	4	22.2

Table 2. The frequencies of agricultural activities among farmers.

Remittances

Eight of the surveyed HH expressed that they receive financial support from someone outside of Entebar, mostly from their children. 19 out of the 22 surveyed HH have one or more children living outside of Entebar, indicating an outmigration of the younger household members. From our survey a clear tendency of periodically working outside of Entebar and eventually returning to Entebar was observed. 21 of the 22 respondents (95.5%) stated that they have lived somewhere else besides Entebar.

Collecting forest products & hunting

Five HH stated they are active in hunting, four of these for own consumption & selling and one respondent solely for own consumption. 16 HH in total collect forest products. On a transect walk jungle produce was identified as 1) wild fruit trees, 2) mushrooms , 3) materials like wild bamboo and bark from trees, and 4) wild vegetables for consumption[16]. Our data shows a tendency of the forest produce mainly being used for own consumption, while some are selling it as well, adding to their income (four respondents). Only one HH collected forest produce for the sole purpose of selling it. They stated that they either sell it in Sri Aman or a Chinese shop located around the corner of the village. Others expressed that even though they have a lot of forest produce, demand is too low to sell it[17].

[16] Forest products were identified by informants during the transect walks.
[17] Information from SSI.

Image 5. Guide identifying NTFPs. (Left to right) Mushrooms, bark and langir (wild fruit).

Image 6. Guide collecting letup (wild vegetable)

Dividends from joint-ventures

Along with 17 other longhouses in the area, the villagers of Entebar are part of a joint-venture contract with the *Sarawak Oil Palm* (SOP). The joint-venture started over 40 years ago, and was set to develop four land plots with oil palm for two periods (one period is 30 years)[18]. As of now, only the land compensation has been paid and no dividends were paid-out. Due to this, the villagers plan to withdraw from the contract in order to start another development project with another company - the Lipp Engineering company.

[18] Information from SSI with the Headman.

Other activities and incomes

This group contains incomes and activities we found could not be attributed by any of the above sections, but are too few and specific to make a representative category or statement on their own. Six of the respondents from the HH survey have been or are currently working for the Government, five of which are receiving a government pension and one receiving a stable monthly income from their work. Besides this, a few HH stated that they receive BRIM support, which is a Government-funded financial support (RM300/year) targeting HH with a low or no income.

3.1.2. Livelihood portfolio archetypes & capitals

Though reductive in nature, the purpose of these following archetype characterizations is to describe patterns identified by the activities and income sources in the livelihood portfolios of the HH in Entebar (Scoones, 1998).

According to Schoones (1998), an important dimension of an analysis of livelihood portfolios and ultimately strategies of households is, to investigate the combination of livelihood capitals they require. It is never given that all households have the same composition of capitals, and therefore the following section will provide an overview of the archetypes in relation to different livelihood capitals and livelihood strategies. In our case the livelihood capitals are based on 1) human, 2) social, 3) financial and 4) natural capital. The latter being a communal capital, as we found, that natural resources in the case of Entebar is accessible and influencing all HH.

The categorization is mainly based on data from the questionnaires. As one respondent only recently moved to Entebar and another one only partly resides in Entebar, we found that the data obtained in the questionnaires was not properly covering their livelihood activities and portfolios. Therefore, we decided to not include these two households in the following archetypes, which represents 20 HH out of 26 HH in Entebar.

Archetype 1: Household with few incomes and agricultural activities

Covering six HH, this group is characterized by having two or less agricultural activities, being: cultivation of food crops, such as rice and fruits, and otherwise few or no incomes besides receiving either remittances or BRIM. HH in this category also collect forest produce, both for own consumption and selling. This archetype is characterized by a low level of livelihood diversification.

Households in this category mainly addressed health, food security and financial security as their main challenges, indicating a lack of financial, human and social capitals, which are required to diversify their livelihood portfolios. This can partially be explained by the fact, that the majority of these households consist of either unmarried or widowed individuals, a majority of these being women. The lack of financial capital is also expressed by an absence of motor vehicles in these HH, where the large majority does not own any, and only a few own a motorbike.

Archetype 2: Household with agricultural diversification

This archetype covers seven HH and is characterized by a relatively high level of agricultural diversification. The HH have a range of different agricultural activities both for own consumption and selling. Typically, HH in this category cultivate fruits and vegetables as food crops, rubber and pepper as commodity crops, while some cultivate rice and/or have a fish pond[19]. Significant for this archetype is, that some HH also have poultry and/or pig farms. Further, most HH also collect forest produce for their own consumption. The incomes in this archetype are mainly generated through the HH's agricultural activities and in some cases they receive financial support from outside. There seems to be a large variation between HH incomes in this category, emphasizing that some combinations of agricultural activities generate higher incomes than other. The reason why some HH have a higher level of agricultural diversification than other, may be related to the variation in the composition of financial, social and human capitals of HH in this category. While some HH expressed that they are currently not facing any challenges, other households directly addressed health as their main challenge. On the contrary to archetype 1, all households in this category consist of married couples. Assuming that having a spouse is a social capital used to pursue a diversification strategy, this may be part of the explanation of why we observed different strategies between HH in archetype 1 and 2.

Archetype 3: Household receiving government pension or other stable incomes

This archetype covers seven households, characterized by having a stable income from non-agricultural activities. A majority is involved with farming, all of which are cultivating

[19] Including one HH currently involved with fishing activities, though no data of ownership of a fish pond could be made out from the survey data..

rubber. Some are also cultivating other commodity crops, such as oil palm and pepper. In this category only one household cultivates rice.

Some members of the respective HH in this archetype have an occupation outside of Entebar, and few HH receive support from family and friends outside of Entebar. However, significant for this group is that a large majority are receiving a government pension, indicating that the age of HH members in this category is above 60. Not surprisingly, some of the HH therefore expressed health as their main challenge, yet none of the households expressed concerns regarding their financial situation. Suggesting, that this category in general has the financial and social capital required to diversify their income-generating activities, by also producing commodity crops. However, they do not seem to be dependent on the production of e.g. rice for their own consumption.

3.1.3. Communal resources

The above mentioned archetypes are both influenced by the individual HH compositions of human, social and financial capitals, but also by natural capitals. The natural capitals are highly linked to the activities the villagers in Entebar are engaging in, such as agricultural activities, fishing and collecting jungle produce or hunting. As such, the following section shall outline and discuss results in terms of the quality of the water and the adjacent secondary forest, which is a source for jungle produce of the villagers.

The forest in Entebar is covered with lowland dipterocarp forest[20] and can be identified as a secondary forest[21]. In the conducted forest assessment we found that the investigated forest is characterised by a moderate level of biodiversity according to the Shannon-Wiener Index[22], with a healthy secondary forest[23] (See Appendix A1 for calculations). A majority of the households of Entebar use the forest resources to collect NTFPs, emphasizing the importance of the forest as part of the natural capital.

In terms of water, the Entebar river, located near the village, was characterized through the miniSASS test as being in a natural unchanged condition, meaning that the overall quality of the water at that location is good (Appendix A4). As mentioned earlier, the living conditions for aquatic species could not be assessed in the river, due to a lack of data. Nevertheless, the

[20] Lowland dipterocarp forest can be classified as forests, that are located in areas up to 500m above sea level and have a coverage of over 20% of the species *Dipterocarpaceae* (Slik et al., 2003).
[21] Forests that have regenerated through natural processes after a disturbance caused by nature and/or human activity of the original forest vegetation (Chokkalingam, 2001).
[22] Levels range from 0 to 5, where normal levels are between 1,5 to 3,5.
[23] AGB measures above average according to Mukul (2016).

fact that the Tagang scheme is still in place and no one seems to fish in the river may indicate that they are not optimal.

However, in Entebar, another natural resource that the villagers depend on is drinking water, which is directly linked to human capital in terms of health (UN, 2013; Schoones, 1998). Our results show that the water quality is acceptable but not considered optimal for drinking. The table below summarizes the data discussed here, obtained from the water analysis in the gravity feed deposit (GF) and in the filtered water (DW), where Class I is optimal and Class V is nonoptimal.

Parameters (unit)	Gravity Feed (GF)	Class (I to V)	Filtered water (DW)	Class (I to V)
Dissolved Oxygen (mg/L)	5.88	II	5.28	II
Turbidity (NTU)	8.00	II	1.00	I
Total Suspended Solids (mg/L)	210	IV	10	I

Table 3. Parameters in regard to the water analysis discussed.

Our results show that the filtered water is Class I on all parameters[24], except the Dissolved Oxygen[25]. Contrary to the villagers perception, our results are showing that the water is in good conditions. Though the filtered water is acceptable in terms of total suspended solids and turbidity[26], it is not completely reduced to zero, resulting in a brownish colored water, which may explain this observation. As a result, HH who can afford to, do not consume the water and buy bottled water. Linking this to our theory of capitals, we can observe that the quality or presumed quality of the water (natural capital) is linked to the availability of financial capital.

The road, though not a natural capital, is another communal resource that plays an important role for the livelihoods of villagers. The good quality of the road in Entebar allowed them to move freely and the time by car to the closest city (Sri Aman) takes 30-40 minutes, allowing easier access to government offices or markets to sell their produce, whereas before having access to the road took them eight hours. Technically, the road is accessible for all villagers,

[24] See Appendix A2 for all data and GF explanations.
[25] Dissolved Oxygen is the amount of Oxygen dissolved in the water. The less DO in the river, the bigger die-off and decomposition of submerged plants, leading to a reduction of the water quality.
[26] Parameters that indicates the amount sediments and other particles in the water.

nevertheless the financial capital plays in here again, as people not owning a motor vehicle do not have the same possibilities of benefitting from it.

3.2. Schemes and Projects in Entebar

During our fieldwork we identified several government schemes and other initiatives that were in place in Entebar. Out of the 18 households active in agriculture 16 were receiving some kind of governmental support for their agricultural activities. When asked what schemes they participate in, the majority stated they were part of schemes supporting either pepper, rubber or rice. The latter being a pure subsidy scheme, and the other two being planting schemes. Other initiatives were also identified, such as the Tagang project, the SOP joint-venture, and a not yet implemented bamboo project. In the following section, we will present the different schemes and other initiatives in Entebar with a focus on their impacts on and contributions to the livelihoods of households in Entebar.

3.2.1. New Pepper Planting Scheme

The *New Pepper Planting Scheme* (STBL) is implemented by the *Malaysian Pepper Board* (MPB). The scheme itself can be classified as a *planting scheme*, as it supports farmers in working on new pepper plants by providing financial support and agricultural inputs in the form of fertilizers over a period of two years. Its support works in two installments and total support given amounts ranges between RM2,600 and RM10,400[27] (depending on plantation size) (MPB, n.d.).

In Entebar, six households, nearly half of the households cultivating pepper, are part of the *New Pepper Planting Scheme* (STBL) by the MPB. According to the crop ranking, some crops are listed as more demanding in terms of fertilizer and pesticides than others. Costs for fertilizer were considered as generally high[28]. After entering a scheme, the impact on fertilizer costs was presumed differently among villagers: some stated that schemes providing subsidized fertilizer would bring along economic relief, while others stated that fertilizer was still expensive[29]. This is especially the case for pepper cultivation[30], which was also perceived

[27] This number represents all the material and financial support combined. Fertilizer supply is dependent on current market prices (MPB, n.d.).
[28] Information from SSI and crop ranking: The price for one bag of fertilizer is RM100/kg.
[29] Information from SSI, crop ranking and survey data.
[30] Information from SSI.

as the crop that demands the most fertilizer while also being the most vulnerable to pests and diseases[31].

Due to low market prices[32], a majority of the households cultivating pepper currently do not sell their harvest, or only when economically necessary[33]. In both SSIs and casual conversations it was stated, that by receiving fertilizer and pesticides through a scheme, the economic burden of not selling pepper during some periods was alleviated.

3.2.2. Rubber Replanting Scheme

The *RISDA replanting scheme* under the *Ministry of Economics Affair* consists of financial assistance, material support (fertilizer and pesticides) and guidance. Same as the STBL it also works as a planting scheme[34]. Compensation payments are made in several instances over an approximate period of five years[35]. The total supported amount is equal to 13,500RM/ha and they offer additional wet season support of RM600 (RISDA, n.d.).

As in the case of pepper, our informants expressed that they are currently not tapping their rubber trees due to low prizes[36]. While rubber is being highly regulated and supported during its inception period, there seems to be a lack of support for the time after the scheme. Once the scheme terminates with the first tapping of the tree, there's fertilizer and pesticides farmer can apply for through RISDA. Some people being part of the RISDA *replanting scheme* said, they were facing issues with their rubber plants being infected by some sort of pest, but receiving pesticides is a long process[37]. When asked about pest and diseases among rubber trees, the RISDA official stated that there are rarely any issues in Sarawak[38]. Though rubber is perceived as the least labour intensive cash crop[39], with low demand for fertilizer, it is still the crop that farmers enjoy doing the least due to low prizes[40]. When asked about how RISDA handles the fact that rubber farmers are not tapping their trees anymore and whether they

[31] Information from crop ranking
[32] According to the villagers, current market prices for pepper are RM6/kg, while they used to be RM30/kg in the past.
[33] Information from SSI.
[34] Its objective is to increase the productivity and income of rubber smallholders by replanting low-yielding rubber trees with rubber or approved crops for the smallholder sector and achieving an average income of 4,000 RM per household by 2020 (RISDA, n.d.).
[35] First tapping of the rubber tree (RISDA, n.d.).
[36] Information from SSI with RISDA: 5.20 MR/kg according.
[37] Information from SSI.
[38] Information from SSI,RISDA.
[39] Due to the fact that they are not tapping.
[40] Information from Crop Ranking

provide any financial support, the official stated that the farmers "*lack commitment*" and they encourage them to keep their rubber trees and "*hope for better times*".[41]

Reasonings for farmers in keeping the rubber plants without tapping them, could be that clearing of the land is labor intense and time consuming[42].

3.2.3. Federal Government Paddy Fertilizer Scheme

The *SBPKP* is administered under the *Department of Agriculture* (DOA). The aid given is material, in the form free compound and urea fertilizer, and financial. The financial aid consists of 600RM/ha per season as a seasonal harvest loss compensation, called the *Wet season support* (MOA, n.d.). In the crop cranking, a group of farmers expressed that rice is the crop they enjoy doing the most, because it is a staple food crop, and ranked as the crop relatively low on demand of fertilizer and pesticides. Though this benefit can be identified from the scheme, insecurities were expressed about the application process and weather or not they will receive it in the future[43].

According to survey data, none of the households being part of the scheme expressed challenges with rice being infected by pests and diseases. The two individuals who did, were not part of the scheme and hence not receiving fertilizer or pesticide subsidies. It was expressed that a lot of people depend on rice for their own consumption[44]. The fact that six out of the eight farmers receiving the subsidy are also cultivating commodity crops[45], implies that rice is increases food security among households, especially during times when world market prices for rubber or pepper are low.

3.2.4. The Tagang project

The Tagang project[46] is a government intervention aimed towards the whole community. Out of own choice, three households are not involved in the project, meaning they are not included in a "feeding schedule" for the fish and thus don't benefit from the fish[47] - amounting to a total of 24 HH actively taking part in this project. According to the website of the *Department of Agriculture Sarawak* (DOAS) the aim of this "smart partnership" is:

[41] Information from SSI with RISDA.
[42] Information from SSI.
[43] Information from SSI: They apply and then wait for a year to get processed, not sure if they get it.
[44] Information from Crop Ranking.
[45] Information from survey.
[46] Iban for "control and preservation" (DOAS, n. d.).
[47] Information from SSI.

" [...] *to raise awareness of the conservation and commitment of the local community towards increasing river fish production for food as well as promoting ecotourism.* [...] *it also promotes responsible behavior in preventing, controlling and reducing river pollution to protect the natural environment for future generations.*", (DOAS, n. d.).

In Entebar, the project was implemented after Entebar and two other villages complained to the DOAS that the nearby river was being polluted with plastic waste and other harmful substances and as a consequence the fish disappeared[48]. The DOAS provides villagers with fingerlings and fish feed. The underlying purpose is to maintain villagers engagement in that project. When addressed, some villagers expressed that this scheme is "*getting fish for free*"[49], indicating that little effort is needed in order for the project to deliver them fish. According to several villagers, the DOAS persuaded the villagers to stay in the project after initial harvest yields were low and the other two villagers dropped out.

The fish are caught in a cycle of three years[50] after regularly applying the fish feed. However, during casual conversations, villagers said that they fish more often. For instance, when important people, such as government officials, visit Entebar.

As part of the Tagang the DOAS established a *fund*, which is managed by three villagers in Entebar. The cash flow into the fund is generated by fines, which are issued to people for illegal fishing[51]. To access the fund, villagers need to make a proposal with a "good reason" for using the money, in which they state for what they would like to use part of the funds. The proposal then needs to be approved by all of the villagers.

Our water analysis of the Tagang system[52], showed that the water does not provide optimal living conditions for aquatic life. This is due to the section of the river, where the fish are being let loose, having *low oxygen levels* (Dissolved Oxygen mg/L (DO)) as a result of the narrow and slow stream[53] (Table 3).

[48] Information from casual conversations.
[49] Information from Transect walk to the Tagang area.
[50] It takes three years until the fish are fully grown.
[51] Illegal fishing is considered all fishing activities, that the villagers did not agree to as a community. The fine is RM500.
[52] See appendix A3 for more details.
[53] Dissolved Oxygen is the amount of Oxygen dissolved in the water. A right Dissolved Oxygen is essential for good water quality. The lower the concentration, the greater the stress. According to the professor Mr Tay, Oxygen levels lower than 4 mg/L can result in large fish kills.

Parameters (unit)	Tagang Upstream (TG2)	Class (I to V)	Tagang Downstream (TG1)	Class (I to V)
Dissolved Oxygen (mg/L)	5.59	II	4.10	III
Total Suspended Solids (mg/L)	310	V	200	IV

Table 4. Most relevant parameters obtained

As the measurement was taken during the rainy season, there is a probability that during the dry season, when the stream suffers a reduction or stops completely, the DO level will decrease even more, leading to a collapse of the system and the sudden death of the fishes.

Another problem identified is a high level of *TSS*[54], which can clog fish gills, either killing them or reducing their growth rate (Bala, 2015). The ability of algae to produce food and oxygen may be affected due to the reduction in light penetration from the particles in the water that are not dissolved (Bala, 2015).

Concludingly, the benefits identified from the Tagang project is the harvest of fish every third year and occasionally in between, providing the villagers with a protein source and an income source, when harvest surplus is being sold. Another income-generating source is the fund, which could help the villagers in economically difficult times[55].

The data from both the water analysis and the information we gathered about the procedure of the project from the villagers, reveals that the Tagang does not necessarily provide any sustainable purpose. The fish don't reproduce in a natural manner and the initial issue of the river being polluted is not being attacked. Four main reasons were identified: 1) fishes are fed on a daily basis, 2) harvest all the fishes at the same time, depending on new fishes provided by the government, 3) there is a risk of collapse of all fishes (DO low levels), 4) and that fishes die or have a low growth rate (TSS high levels).

3.2.5. Joint-ventures: SOP & the "Bamboo Project"

The previous section presented our findings regarding governmental schemes and projects were presented. As the community also engages in a joint-venture contract with the SOP and plans to engage in another one, this following section will elaborate on those findings. The main objective is to shed light on the communal decision making process of this new project.

[54] Total Suspended Solids are solid particles in the water, that are not dissolved, as sediments or decomposed leaf.

[55] Villagers did not state how often the fund is touched.

Seventeen of the households in Entebar are currently involved in a joint-venture with the SOP, which was set to develop oil palm on NCR land more than 40 years ago. The contracted land under the SOP is 14,500 hectares (4 plots), but so far only 3,000 hectares (2 plots) have been developed with oil palm. One person stated, that the motivation for him joining the SOP was that the plots were hard to access as they were too far away, and that he would prefer someone else working on it than not using it at all[56].

The annual compensation for the land used to be 150 RM per hectare, but was increased to 400 RM[57]. According to several villagers, no dividends have been paid to them during the 40 years. As the SOP promised to plant palm oil but barely did, the villagers are in the process and talks with another development company, the *Lipp Engineering company*[58], that wants to develop the area with bamboo[59]. The area in question is big and in total 25 longhouses ant the village Batu Lintang are involved. The premises of the project is that every actor has to agree on the contract and agree to lease the NCR land to the developers[60]. The incentive to turn to the bamboo project is that the land compensation is higher than the one from the SOP. In the first three years the payment is 300RM/acre, and after that it's 400RM/acre[61]. Our findings show that there is a connection between the experience with SOP and the apprehension towards renting NCR land for the new Bamboo project. One informant expressed that there's a general concern about the dividends among the majority of the people, potentially involved in the new project, and that the information they receive is not satisfying[62]. However, during a SSI a villager stated, that he would prefer the new project over the SOP, as you can already harvest the bamboo after three years, possibly resulting in a sooner payment of dividends [63].

Besides the dividends, there are other potential benefits coming along with the project. One informant addressed, that he was hoping for the "Bamboo Project" to invest in a new road leading to the plots, so that there would be easier access. With easier access, it is more likely that the bamboo will actually be planted and cared for, which would result in more dividends [64]. One informant stated, that he does not want to participate, because he is unsure about the

[56] Information from SSI (5)
[57] Information from SSI.
[58] According to the Headman, the Lipp Engineering company is a chinese land development company.
[59] Information from SSI with the Headman.
[60] Information from SSI with the Headman.
[61] Information from SSI (5).
[62] Information from SSI (15).
[63] Information from SSI (8)
[64] Information from SSI (5)

profitability of the project. He is not interested in getting dividends, because they are volatile, but would prefer a monthly payment, and stated:

> *"*[...] *the companies don't pay the dividends. They* [The Lipp Engineering company] *are only interested in taking peoples things and land*[65].

3.3. Access to and engagement in schemes

The following section will discuss our findings in regard to the formal scheme requirements and other factors potentially impacting whether or not a household chooses to engage or to not engage in a government scheme.

3.3.1. What households participate in schemes?

When it comes to participation in schemes, we found variation between the archetypes. Whitin *Archetype 1 (households with few incomes and agricultural activities)* two out of three households involved with rice receive fertilizer for their rice through a scheme. However, as none of these households are cultivating pepper or rubber, none of them are receiving support from those schemes. *Archetype 2 (household with diverse agricultural practices)* shows another pattern. In this category more than half of the households receive support from pepper or rubber schemes, whereas one receive support from both. In contrast to *Archetype 1* only one within this category receives subsidies for rice. One does not take part in any scheme. The last category, *Archetype 3 (Household receiving government pension or other stable income)* is where we found the highest number of participants in schemes. Four out of six are part of the RISDA replanting scheme, and two out of six are part of the pepper board. Two expressed that they receive a subsidy for rice, where only one of them is cultivating rice.

3.3.2. Factors determining participation

To enter the government schemes identified in Entebar, certain requirements have to be fulfilled. However, we found that not all households chose to participate even though they fulfill the formal requirements. Therefore, in the following section we will not only focus on the formal requirement as a factor determining participation, but also include how participation can be related to the composition of HH's livelihood capitals.

[65] Information from SSI (1)

Formal requirements

To be eligible for support the common formal requirements are, that people have to be at least 18 years of age and be a Malaysian citizen. Further, the individual schemes have more specific requirements (Table 5).

Scheme	Specific requirements
STBL (pepper)	0.1 to 0.4 hectares of titled land (200 to 800 pepper trees) Trees must be planted in advance (under 2 years of age)
Rubber Scheme	0.1 to 40 ha of titled land Clearance of old rubber trees and planting of new trees in advance
SBPKP (rice)	Registered with the *National Farmers Organization* (FAO); Not part of any kind of support for rice provided by the state government

Table 5. Overview of scheme requirements.

In both the case of the rubber and pepper schemes, the applicants must prove that they have a title for the land they apply for (MPB, n.d.; RISDA, n.d.). A farmer, who is currently cultivating rubber, claimed he could not apply for the rubber scheme as he does not have titled land[66]. The MPB, for instance, requires, that the area of titled land has to be between 0.1 and 0.4 ha. The land area requirements for the *Rubber Replanting Scheme* differ from the requirements for the STBL pepper scheme. The titled land area must be at least 0.1 ha and not exceed 40 ha[67]. In Entebar 18 out of the 22 surveyed households expressed that they own titled land. This means, that not all households meet the formal requirements of the pepper and rubber schemes, which is part of the explanation of why not all households in Entebar are receiving support from a scheme. However, we found that the official requirements of a certain scheme, namely the STBL pepper scheme, are bendable, as one household receiving help from the MPB, stated in the survey that they do not own any titled land. When asked about the application process a participant previously being part of the STBL, stated:

[66] Information from SSI.
[67] Information from SSI with RISDA.

"[it] *depends on the agricultural department, if you have less trees you can also apply and they might approve. Depends on networking, then it's easier. If you know people, then it's easier for you*"[68].

Implying, that the certain requirements can be "overlooked", if the person has good social connections to the officials in charge.

Further, connections with the officials in charge may also affect whether or not the application of a household meeting the requirements is accepted, and how fast the application is being processed[69]. As one farmer stated, it is a "*lottery*", whether you get approved or not:

"[...] *we always apply for pepper, but sometimes we don't get it.* [...] *Depends on how lucky you are - this year you get it and next year you don't. There's too many applications, so they have to choose.*"[70].

Once the application has been approved by the MPB, farmers get compensated for the materials[71] they financed and used in advance to be eligible for the scheme. For the pepper schemes, the precondition is, that farmers need to own at least 200 pepper plants under the age of 2 on titled land[72]. This requirement may also explain why some households, although fulfilling the land requirement, do not participate in schemes. Additionally, reapplications for the scheme from the MPB are only eligible for reconsideration after one year from the second year they received assistance. A farmer, who previously received support through the MPB, stated that start-up costs for the pepper are too high for him to re-apply. As explained by the government official from RISDA[73], a similar requirement is needed in order to receive payment. Land clearing and planting must be proved in order to receive the support. This indicates, that not all households have the financial capital or security to invest in the start-up phase before the implementation of a scheme.

[68] Information from SSI (6).
[69] Information from informal conversations.
[70] Information from SSI (4).
[71] The compensated materials are wooden bars for the pepper plants and cuttings of the plants (MPB, n.d.).
[72] Information from SSI.
[73] Information from SSI with RISDA.

Other factors

In Entebar, a certain pattern is revealed regarding livelihood portfolios and participation in schemes. The households receiving a regular income in the form of a government pension, archetype 3, are often participating in one or more schemes. On the contrary, the households consisting of individuals with no spouses and low incomes, mainly cultivating rice and fruits, archetype 1, do not participate in rubber or pepper schemes although they have titled land. In terms of land area, pepper and rubber have different demands.

Pepper can be cultivated on relatively small plots, indicating that even farmers owning only a small area of titled land technically have the possibility of engage in pepper cultivation with the help of a planting scheme. Nevertheless, the financial aspect seems to be the overarching issue in this archetype, as the start-up costs for pepper are considered high.

This adds to the argument, that more capitals than land are import factors determining if households are able to participate or not, and if they want to in the first place. Our findings shows that factors like personal prioritisation, age and health issues may nuance our understanding of the ability to participate in schemes and other initiatives.

Archetype 2 is characterized by their ability to diversify their agricultural activities. This type of livelihood strategy requires a lot in terms of labour. As an informant emphasized, this is especially the case if you cultivate pepper, as this agricultural practice involves many tasks[74]. This can be directly linked to the choice to participate in the Tagang project. An informant expressed not being able to commit to the fish feeding, as he was prioritizing his/her time with caring for his/her own land[75].

Another factor influencing participation in schemes expressed by some informants is age related health issues. Our survey shows that the average age of the population is above 50 years. An informant, a younger villager, confirmed this, and related it to the fact that the younger generation often moves to larger cities and is no longer interested in staying in the longhouse and engaging in farming practises[76]. The same informant expressed that his/her parents are not dependent on the agricultural activities as they receive a government pension[77] . This can be related to the findings for Archetype 3, characterized by having other, stable income besides agricultural activities. This can relate to why this archetype is the least involved with the cultivation of rice. One of our crop ranking sessions, solely consisting of

[74] Information from SSI.
[75] Information from SSI.
[76] Information from SSI.
[77] Information from SSI.

participants from this archetype, lead to an interesting discussion about the importance of rice. One stated that cultivating rice makes life easier, where the other participants disagreed by explaining that they can buy rice, and that rice is too physically demanding, especially during harvest time. Our findings show that not relying on rice for the food security of the household, makes this archetype able to accommodate their concerns about age and health, therefore making it a factor influencing the participation in rice cultivation, making this archetype less reliant on DOA (Rice scheme) in terms of their livelihood strategy.

3.4. The influence of schemes on livelihoods in Entebar

From our findings, we argue that government schemes and other initiatives can have ambiguous influence on households in the same community, and they are therefore not straightforward to analyse in a context of livelihood strategies and outcomes. Returning to Scoones' (1998) definition of sustainable livelihoods as households that, 'can cope with and recover from stresses and shocks, maintain or enhance its capabilities and assets, while not undermining the natural resource base' (p.5) we have not found clear evidence that government schemes influence and increase the overall sustainability of all households in Entebar. In general, as observed in the case of archetype 1, households with low financial, human and/or social capital do not currently receive support from planting schemes. This lead us to argue, that the benefits of these government schemes, such as material support, in the form of fertilizer and/or pesticides, financial support as in the case of rubber and the possible future incomes, are not distributed equally amongst households in Entebar. We find, that several factors are influencing whether or not households receive support from government schemes, including financial capital, lack of eligible land area, as well as lack of social and human capital, related to e.g. health issues or reduction in households size. Although providing certain households with agricultural inputs, low prices on pepper and rubber, imply that income may not currently be generated. We find, that rubber and pepper cultivation is often acting as investments, or "savings" for households who do not urgently need the income. This is because they either have another stable income, or are able to diversify their agricultural practises, generating a higher income security, observed for households in both archetype 2 and 3.

This argument opens up for a discussion regarding what Ngidang (1995) refers to as the "subsidy-syndrome", the idea that subsidy schemes have created a dependency among

farmers. The abundance of various government schemes in Entebar, makes this relevant to discuss in the case in Entebar. The fact that the schemes do not necessarily provide a direct financial income, ultimately lead us to question if the schemes are an important factor determining the outcome of different livelihood strategies in Entebar. Supporting this argument is the fact that the main concerns regarding health and age raised by the villagers of Entebar, are not addressed through these schemes. This emphasizes a dependence on other income sources, such as remittances and pension.

This could also explain why those sceptical of renting out their land to the new Bamboo project, still prefer the chance of a profit, over the effort of using the land for agricultural activities. The time frame of the different schemes is an important factor worth questioning. Considering that many villagers expressed concerns about their ability to harvest and maintain their crops in the future, we argue that the present needs of all households in Entebar are not met by the schemes in their current form. Because our finding only provide a snapshot of an observed reality at this moment, we can only speculate on the future influence of schemes on livelihood strategies. However, our findings suggest that some households, whether or not they participate in schemes, may not be able to maintain their agricultural practises in the future, which could ultimately threaten the livelihoods of many households in Entebar.

4. Methodological considerations & Limitations

This section will address the limitations of our methods. During the data analysis and the report writing process, we realized that some other relevant data could have been collected in order to get a better understanding of our research objective.

Natural science: water & soil sampling

The parameters obtained had been compared with the "Raw Quality Drinking Standards" provided by the Malaysian Ministry of Health. It is important to mention that there are still many water quality parameters in the list that we did not test during the field course, so the judgement is only based on the results of DO, pH, AN, COD, PO_4^{3-}, TDS, TSS, turbidity and salinity, which were analysed during the field course. The same applies to the data obtained for the Tagang System. The assessment of other parameters could have provided a better scope. In general, a repetition of the sampling in different periods of time and different

meteorological conditions[78] would have provided a more precise assessment. Soil sampling could not be conducted properly, but would have delivered important information regarding our research questions.

Our survey design

We had an open-ended question identifying participation in schemes, which in retrospect should have been a list asking for participation in schemes we identified, as schemes were understood different by the villagers. The same goes for information regarding JV.

Due to an initial lack of knowledge regarding the land tenure system, Q18 and Q19, where we ask if the respondents have land, and move on to ask how they obtained their land could have been refined. We did not specify what type of land, NCR or titled, resulting in confusion for the respondent, and difficulties in analysing the data. In hindsight the 'I do not know' option for Q22 made it difficult for us to know if they have titled land or not. We are only able to assume that they do not know *how much* of their land is titled, not whether they have titled land or not. Questions regarding household information could have been more inclusive by asking questions about age of the household members, as well as asking for not only financial but material support from

Semi-structured interviews & Informal interviews

Our informant were chosen by their agricultural practises, involvement in schemes, and land. In presenting our results it became clear, that we did not interview any people having less than two agricultural activities, which may have added to insights and nuances on archetype 1 in our results. Many of the SSI were conducted with other people and family members around, resulting in disturbances and potentially disrupting the information exchange. In retrospect, informal interviews could be biased by our perceptions and understanding of the context in which our research took place, and formed by the different people we engaged with. This point is important to stress since there may have been an asymmetric relationship between our engagement with the different villagers[79].

[78] We should also take into consideration that the measures were taken under rainy conditions.
[79] Field is referring to the people, surroundings, knowledge, perceptions, ect. related to our research objectives.

5. Conclusion

Through the identification of the different income sources of Entebar, we have found that the livelihood portfolios can be characterized by three main archetypes 1) Household with few incomes and agricultural practices, 2) Household with agricultural diversification, 3) Household receiving government pension or other stable income. The natural resources of good quality are available on a communal level, which makes this capital a common resource for all the above livelihood portfolios. Nevertheless, due to the other, mainly financial capital, households benefit differently from them.

Our focus was to investigate agricultural schemes and initiatives present in Entebar, identifying RISDA, DOA, MPB, the Tagang project and the bamboo project, as well as the private-public partnership, the SOP. The benefits identified through these schemes and projects are scarce. As most governmental schemes rarely provide any financial support, farmers not selling their harvest due to low market prices, do not benefit from these. Our further results show that the lack of dividends, which is not yet received, from the involvement with the SOP are linked to the decision to participate in the "Bamboo project". We have found that the access to schemes is influenced by a combination of financial, social and human capitals, which we conclude influences the different archetypes ability to participate in schemes, also complicating that the people most financially reliant on agricultural activities, are not necessarily the ones being able to access the schemes. We conclude that we have not found clear evidence that government schemes influences and increase the overall sustainability of all households in Entebar. Ultimately the different livelihood strategies identified, are depended on other income sources, pension and remittances, than the agricultural activities supported by schemes, which lead us to conclude that the schemes and initiatives may not address the current concerns and challenges of the villagers of Entebar in terms of their livelihoods.

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Appendix

A: Natural science

A1: Forest Resource Assessment

Total species identified in local name (and identification of most of latin names)

Tree n	Subplot	Species Iban	Latin name	Diameter (cm)	Height (m)	Above-ground biomass of tree (kg)
1,00	1,00	berburai		7,50	8,00	13,74
2,00	1,00	semambuk	Azadirachta indica	5,00	6,00	4,58
3,00	1,00	berburai		6,90	7,00	10,18
4,00	1,00	berburai		7,20	8,00	12,67
5,00	1,00	getah	Hevea brasiliensis	14,00	10,00	59,86
6,00	1,00	kemidan		65,00	18,00	2.322,57
7,00	1,00	kemidan		52,00	15,00	1.238,70
8,00	1,00	ubah	Sygyzium paradoxa	6,00	9,00	9,89
9,00	1,00	empilik	Lithocarpus spp.	7,30	7,00	11,39
10,00	1,00	merampak		42,00	10,00	538,73
11,00	1,00	kemidan		54,90	18,00	1.656,86
12,00	1,00	getah	Hevea brasiliensis	14,30	10,00	62,45
13,00	1,00	kandis	Garcinia xanthochymus	16,10	7,50	59,37
14,00	1,00	melaban		14,10	9,00	54,64
15,00	2,00	ubah	Sygyzium paradoxa	13,10	6,00	31,45
16,00	2,00	ubah	Sygyzium paradoxa	10,40	9,00	29,73
17,00	2,00	getah	Hevea brasiliensis	26,90	10,00	220,99
18,00	2,00	ubah	Sygyzium paradoxa	6,10	7,00	7,95
19,00	2,00	empaling		20,90	15,00	200,10
20,00	2,00	empaling		10,10	8,00	24,92
21,00	2,00	getah	Hevea brasiliensis	17,80	8,00	77,41
22,00	2,00	kandis	Garcinia xanthochymus	33,80	7,50	261,68
23,00	2,00	ubah	Sygyzium paradoxa	10,10	6,00	18,69
24,00	2,00	ubah	Sygyzium paradoxa	6,90	6,00	8,72
25,00	2,00	getah	Hevea brasiliensis	30,10	9,00	249,03
26,00	2,00	umpang	Kaema ssp	5,00	6,00	4,58
27,00	3,00	engkerutak		7,50	5,50	9,45
28,00	3,00	selungsur	Tristaniopsis beccarii	8,40	5,00	10,77
29,00	3,00	getah	Hevea brasiliensis	20,00	11,00	134,38
30,00	3,00	kandis	Garcinia xanthochymus	19,00	8,50	93,71
31,00	3,00	sengkaong		12,40	5,00	23,48
32,00	4,00	getah	Hevea brasiliensis	19,40	10,00	114,94
33,00	4,00	getah	Hevea brasiliensis	30,20	18,00	501,37
34,00	4,00	kandis	Garcinia xanthochymus	15,40	9,00	65,19
35,00	4,00	ubah	Sygyzium paradoxa	5,50	6,00	5,54
36,00	4,00	kayu malam	Diospyros buxifolia	6,00	3,00	3,30
Total AGB						8.153,02

Above Ground Biomass calculation and allometric equation used calculate moist tropical forest

	AGB Calculation in Secondary Forest
AGB (Kg for 20x20m plot 400 m2)	8.153,02
AGB in (T/Ha) in diameter over 5cm	203,83
AGB in (T/Ha) in diameter over 10cm	201,01

$$\langle AGB \rangle_{est} = \exp(-2.977 + \ln(\rho D^2 H)) \equiv 0.0509 \times \rho D^2 H$$

Shannon-Wiener diversity index and ecuation:

Tree species	Count of the tree of each specie	Shannon index variable name	Shannon index calculation
berburai	3,00	=n1	- 0,21
semambuk	1,00	=n2	- 0,10
getah	8,00	=n3	- 0,33
kemidan	3,00	=n4	- 0,21
ubah	7,00	=n5	- 0,32
empilik	1,00	=n6	- 0,10
merampak	1,00	=n7	- 0,10
kandis	4,00	=n8	- 0,24
melaban	1,00	=n9	- 0,10
empaling	2,00	=n10	- 0,16
umpang	1,00	=n11	- 0,10
engkerutak	1,00	=n12	- 0,10
selungsur	1,00	=n13	- 0,10
sengkaong	1,00	=n14	- 0,10
kayu malam	1,00	=n15	- 0,10
SUM:	36,00	=N	2,37

$$H' = -\sum_{i=1}^{s} p_i \ln p_i,$$

A.2 Water assessment of the drinking water

Data obtained from the gravity feed deposit the filtered water

Parameters (unit)	Gravity Feed (GF)	Class (I to V)	Filtered water (DW)	Class (I to V)
Temperature (°C)	25.30	I	26.10	I
Dissolved Oxygen (mg/L)	5.88	II	5.28	II
Chemical Oxygen Demand (mg/L)	7.00	I	3.00	I
Total Dissolved Solid (mg/L)	9.07	I	16.30	I
Salinity (%)	0	I	0.01	I
pH	8.6	I	7.82	I
Turbidity (NTU)	8.00	II	1.00	I
Phosphate (mg/L) *	0.03	-	0.05	-
Ammoniacal Nitrogen (mg/L)	0.00	I	0.00	I
Total Suspended Solids (mg/L)	210	IV	10	I

8081

Despite many parameters classify as class I, the water quality is acceptable but not considered ideal for drinking. This is due to different factors. Both the TSS and turbidity was high on the GW, indicating sediments in the water, which based on our observation could be due to the logging activity in the surroundings, leading to an erosion causing the sediment deposition. We observed that the water flow was low, which could be linked to leaf decomposition. For DW, the water quality for TSS and turbidity were classified as class I, but the numbers were not reduced completely. That could explain why the villagers always showed their concern[82] regarding the colour of the water. DO classified as class II in both GW and DW[83], which may lead to a reduction of invertebrates and other important for the water quality.

This can be be explained by the level of TSS (total suspended solids), and turbidity, (indication the color of the water) in the feed water indicating sediments in the water, which based on our observations could be due to surrounding logging activities, resulting in an erosion causing sediment deposition. We also observed that the water flow was low, which could be linked to leaf decomposition.

[80] Despite Phosphate is not harmful to humans and therefore not contemplated in the Raw Quality Drinking Standards, high inputs can lead to an impact of ecosystems and damage of health of rivers due to eutrophication.
[81] Despite TDS appears to be higher in the filtered water, class II requires 500 mg/L, therefore it did not show a significant difference and qualified as class I.
[82] SSI and informal talks.
[83] The reduction in the latter is because the water tank is not in contact with the air (therefore losing Oxygen gradually) and there is not flow of water that can incorporate Oxygen.

A.3 Water assessment of the Tagang Project

Below we can see the chemical and biological measures obtained. TG2 refers to the upstream section, and TG1 to the Tagang system section.

Parameters (unit)	Tagang Upstream (TG2)	Class (I to V)	Tagang Downstream (TG1)	Class (I to V)
Temperature (°C)	25.10	I	25.60	I
Dissolved Oxygen (mg/L)	5.59	II	4.10	III
Chemical Oxygen Demand (mg/L)	11.50	II	11.50	II
Total Dissolved Solid (mg/L)	14.97	I	11.70	I
Salinity (%)	0.01	I	0.01	I
pH	9.26	I	8.60	I
Turbidity (NTU)	23.50	II	22.50	II
Phosphate (mg/L) *	0.05	-	0.02	-
Ammoniacal Nitrogen (mg/L)	0	I	0.05	I
Total Suspended Solids (mg/L)	310	V	200	IV
Biochemical Oxygen Demand **	-	?	-	?
Total Coliform Count	1775	I	6250	II

*Despite Phosphate is not harmful to humans and therefore not contemplated in the Raw Quality Drinking Standards, high inputs can lead to an impact of ecosystems and damage of health of rivers due to eutrophication.

**No data from BOD could be obtained since the display of the device broke.

The DO in TG1 shows a very low number. Even though the measures were taken during the rainy season, the fishes were supplied with Oxygen from a very small and slow stream. These levels can be reduced more on the dry season since the stream will be even lower, and the fishes could potentially die in a group[84].

The pH difference is probably due to the $CaCO_3$ (alkaline) rocks identified upstream, which lead to a raise of pH.

The analysis on AN shows that the influence of Titing Kha village practices (garbage management) and fertilizers applied to the surrounding fields might be related with the difference between TG2 and TG1 (0 vs 0.05 mg/L)and also with similars level of Phosphate (0.05 and 0.02 mg/L).

[84] Information provided by Inorganic and Environmental Chemistry Professor, Mr Tay.

A.4 MiniSASS of Entebar river

The data obtained showed a total score of 41, with five different number of groups, resulting in a miniSASS score of 8,2 and showing that in rocky type river the ecological condition was "natural/unchanged/untouched".

Scoring

1. On the table, circle the sensitivity scores of the identified organisms.
2. Add up all of the sensitivity scores.
3. Divide the total of the sensitivity scores by the number of groups identified.
4. The result is the **average score**, which can be interpreted into an ecological category given below.

Interpret the miniSASS score:

Although an ideal sample site has rocky, sandy, and vegetation habitats, not all habitats are always present at a site. If your river had no rocky habitats that were sampled, use the **sandy type** category to interpret your scores.

GROUPS	SENSITIVITY SCORE
Flat worms	3
Worms	2
Leeches	2
Crabs or shrimps	6
Stoneflies	17
Minnow mayflies	5
Other mayflies	11
Damselflies	4
Dragonflies	6
Bugs or beetles	5
Caddisflies (cased & uncased)	9
True flies	2
Snails	4
TOTAL SCORE	41
NUMBER OF GROUPS	5
AVERAGE SCORE (miniSASS Score)	8,2
Average Score = Total Score ÷ Number of groups	

Ecological category (Condition)	River Category	
	Sandy Type	Rocky Type
NATURAL CONDITION (Unchanged/untouched – Blue)	> 6.9	> 7.2
GOOD CONDITION (Few modifications – Green)	5.9 to 6.8	6.2 to 7.2
FAIR CONDITION (Some modifications – Orange)	5.4 to 5.8	5.7 to 6.1
POOR CONDITION (Lots of modifications – Red)	4.8 to 5.3	5.3 to 5.6
VERY POOR CONDITION (Critically modified – Purple)	< 4.8	< 5.3

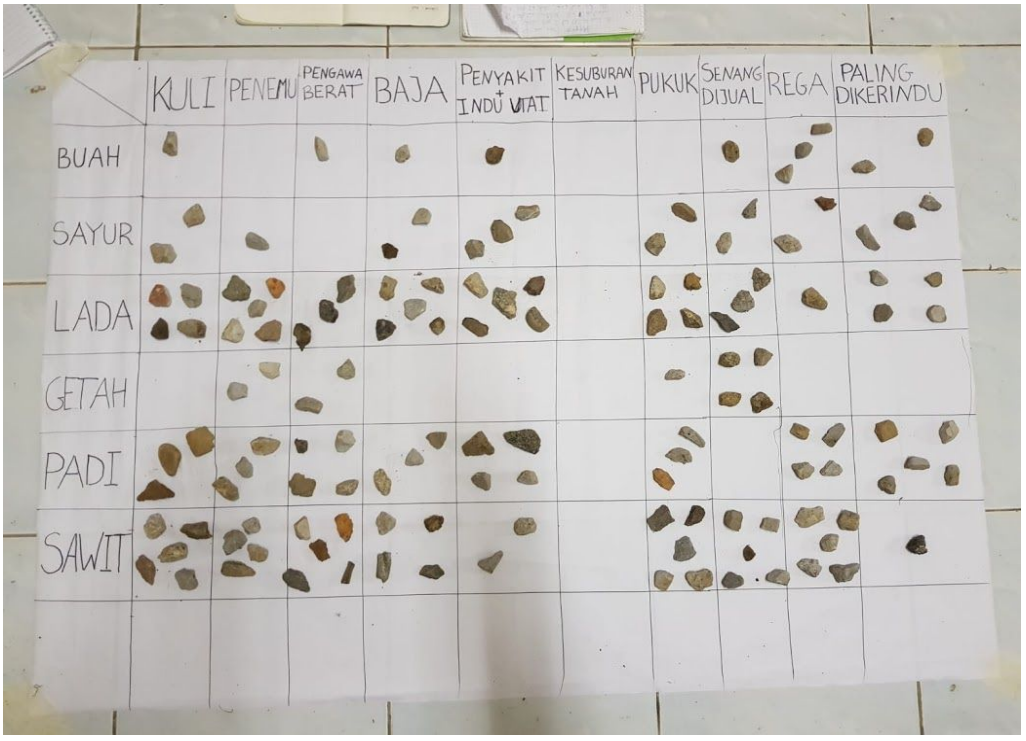
A.5 Soil parameters obtained

The red yellow podzolic soils in Entebar are classified as ULtisols by the USDA Soil Taxonomy (USDA Global Soil Regions Map, 2005). The structure of the soil was defined thanks to the expertise of UNIMAS professor Dr. Gabriel, who determined that the type was clay loam.

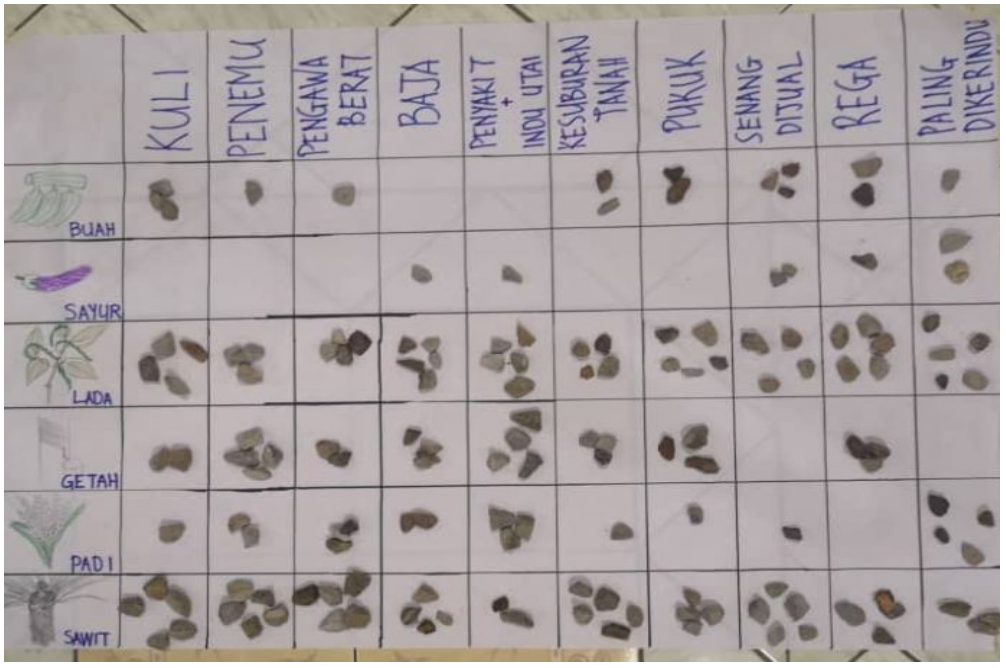
	Oil Palm	Pepper	Secondary forest
pH	4,37	5,01	4,58
Bulk density (g/cm3) 0-10 cm	0,8987	1,0632	0,9292
Bulk density (g/cm3) 10-20 cm	0,8268	1,0775	0,8771

B: Social Science

B.1 Crop ranking results



Above is the result of the ranking session in H2



Above is the result of the ranking session in H1

Table) Comparing our results from H1 and H2

	Fruits	Vegetables	Pepper	Rubber	Padi	Oil palm
Labour demanding	H1: 3 H2: 1	H1: 0 H2: 2	H1: 4 H2: 4	H1: 2 H2: 0	H1: 1 H2: 3	H1: 5 H2: 5
External advisory	H1: 1 H2: 0	H1: 0 H2: 1	H1: 3 H2: 5	H1: 4 H2: 2	H1: 2 H2: 3	H1: 5 H2: 4
Physically demanding	H1: 1 H2: 1	H1: 0 H2: 0	H1: 4 H2: 3	H1: 2 H2: 2	H1: 3 H2: 4	H1: 5 H2: 5
Dependent on fertilizer	H1: 0 H2: 1	H1: 1 H2: 2	H1: 5 H2: 5	H1: 3 H2: 0	H1: 2 H2: 3	H1: 4 H2: 4
Vulnerable to pests + disease	H1: 0 H2: 1	H1: 1 H2: 3	H1: 5 H2: 5	H1: 4 H2: 0	H1: 3 H2: 4	H1: 2 H2: 2
Declining fertility	H1: 2 H2: X	H1: 0 H2: X	H1: 4 H2: X	H1: 3 H2: X	H1: 1 H2: X	H1: 5 H2: X
Start up costs	H1: 2 H2: 0	H1: 0 H2: 2	H1: 5 H2: 4	H1: 3 H2: 1	H1: 1 H2: 3	H1: 4 H2: 5
Easiest to sell	H1: 3 H2: 1	H1: 2 H2: 2	H1: 4 H2: 3	H1: 0 H2: 4	H1: 1 H2: 0	H1: 5 H2: 5
Most stable price	H1: 2 H2: 3	H1: 1 H2: 2	H1: 5oth H2: 1	H1: 3 H2: 0	H1: 0 H2: 4	H1: 4 H2: 5
Enjoy the most	H1: 1 H2: 2	H1: 2 H2: 3	H1: 5 H2: 4	H1: 0 H2: 0	H1: 4 H2: 5	H1: 3 H2: 1

Has ranked same crop as 'least' = 0 or 1
Has ranked same crop as 'most' = 4 or 5
Has answered very differently = a gap on 3 or more

B.2 SSI guides and overview

SSI (1)

Interviewee	The headman of Entebar Village
Location, Date	His house, Date: 3/3 - 2020
Present	Stanley (Interpreter) Sebrina (Interviewer) Katja (Notetaker)
Interview guide	**Theme 1) Farming practises** - How often do you go to your land? - Give an example of your routine when going?

	- What do you do with your land ? **Theme 2) Participation in schemes** - What are the benefits - give an example? - How do you apply? - Do you apply on behalf of others? **Theme 3) Being the HM** - How long, and requirements for this role? - Daily routine? - What would you describe as your main task? - How did you obtain the prize for the best longhouse and why? **Theme 4) Decisions making processes** - How do you make decisions in the village? - how often do you meet? Do everyone show up? - When was the last meeting, what was discussed?

SSI (2)

Interviewee	A RISDA representative
Location, Date	RISDA office Sri Aman Date: 6/3 - 2020,
Present	Maja (Interviewer), Nana, Katja, Stanley (Interpreter)

Interview guide	**Theme 1) Background** - What is RISDA about? - How is it related to the government? - What is the objective of RISDA today and how - has it changed over the years? - What kind of work does this agency do? **Theme 2) Requirements** - What kind of schemes do you do? - What kind of support do you provide? § Financial/advisory/labour/fertilizer - How do you become part of any scheme? - What are the conditions or requirements to become part of it and to stay part of it? - Timeframe/How long does It last? Is there a scheduled end for the scheme? **Theme 3) Objective** - Which kind of support do you consider as most successful in terms of economic development of the area? - How active is RISDA in the area of Sarawak à Entebar? - What are difficult tasks rubber farmers and other smallholders are facing in Sarawak? Why do they need help?

SSI (3)

Interviewee	Young person living in the LH, working outside
Location, Date	House of the interviewee Date: 3/3 - 2020
Present	Mario (interviewer), Sebrina (Notetaker) Aileen (Notetaker)
Interview guide	**Theme 1) Growing up** - Age, Born in Entebar? - Were there many kinds around in Entebar when young? - If not living in Entebar, were you visiting on weekends or other holidays? **Theme 2) Now** - How comes that you decided to become a teacher? - Did you have other preferences? - Do you live here now? - How often are you here? - How is living in the longhouse? - What do you think about the water tank (drinkable filtered water)? - Are you aware of the meetings in the longhouse?

	Theme 3) Future - Are you planning to farm in the future? - Inheritage of headman. How does it work? - Future of longhouse. Any plans?

SSI (4)

Interviewee	Farmer (1) Title land, Diversified agr. practises. Engaged in few schemes.
Location, Date	House of the interviewee, Date: 6/3 - 2002
Present	Mario (interviewer), Sebrina (Notetaker) Vanessa (Interpreter)

Interview guide	**Theme 1) Intro**
	- Can you describe your day (activities, transport)?
	- Household info?
	- What activities are you involved in?
	  - Where are you selling your produce?
	  - Price fluctuations?
	- Do you have any income source?
	- Where did you hunt or collect forest produce? Do you share with other villagers? What are the main problems that you are facing?
	
	Theme 2) Land
	- Can you describe the land you have? (NCR or title?)
	- Are you using all your land? Why? Example?
	- Have you ever attempted to get your land titled? Can I ask you why/why not?
	-
	Theme 3) Government support
	
	- Do you currently receive any help from government? If yes, please describe the support (timeframe, process, requirement).
	- Schemes. When and why did you apply?
	- Have you previously received any support or been a part of a scheme? If not, have you ever considered applying for a scheme. Why/why not?
	- Have you been involved in the Tagang project? Why/why not?
	- Are you going to take part in the new bamboo project? Why/why not?
	
	Theme 4) Longhouse
	- How long have you lived in the longhouse?
	- Why did you moved here?
	- How would you describe living in a longhouse?
	- What are the downsides of living in the longhouse?
	- How often do you have to go to the village meeting?
	- How is the collaboration between people living in the longhouse?

	- What are the major challenges that the longhouse is facing? - What about the filtered water tank?

SSI (5)

Interviewee	Farmer (2) Diversified agr. practises (bilek 8)
Location, Date	Informants house Date: 6/4- 2020
Present	Nanna (Interviewer), Maja (Notetaker), Azza (Notetaker), Stanley (Interpreter)
Interview guide	**Theme 1) Intro** - How long have you lived in the longhouse? - Can you describe your day, and the activities you engage in? - How far is it to the farms? And are they all located in the same area? **Theme 2) Schems** - For how many years have you had pepper, rubber and oil palm? And why did you choose these three? - Did you apply for anything from the government, when you decided to get involved? And how? - Do you then sell your oil palm to the MPOB? - Where do you sell your rubber? - Do you still harvest the pepper? - Do RISDA provide any help when prices are low? - Is it some sort of compensation for the times where - Regarding RISDA, how did you apply? **Theme 2) Bamboo** - Can you describe the land you have? Is it NCR or titled? - And why do you want to switch to bamboo? - Did you get anything from SOP yet? - And how are you able to switch from oil palm to bamboo? Regarding your titled land, has it always been titled? Are you a part of the Tagang project? Do you know why the three bileks decided to withdraw?

SSI (6)

Interviewee	Farmer (3) Title land, engaged in schemes
Location, Date	Informants house Date: 4/4 2020

Present	Maja (Interviewer) , Katja (observer), Azza (observer) , stanley (Interpreter)

Interview guide	**Theme 1) Intro**
	- Can you describe your day (activities, transport)?
	- Household info?
	- What activities are you involved in?
	  - Where are you selling your produce?
	  - Price fluctuations?
	- Do you have any income source?
	- Where did you hunt or collect forest produce? Do you share with other villagers? What are the main problems that you are facing?
	
	Theme 2) Land
	- Can you describe the land you have? (NCR or title?)
	- Are you using all your land? Why? Example?
	- Have you ever attempted to get your land titled? Can I ask you why/why not?
	
	Theme 3) Government support
	- Do you currently receive any help from government? If yes, please describe the support (timeframe, process, requirement).
	- Schemes. When and why did you apply?
	- Have you previously received any support or been a part of a scheme? If not, have you ever considered aplying for a scheme. Why/why not?
	- Have you been involved in the Tagang project? Why/why not?
	- Are you going to take part in the new bamboo project? Why/why not?
	
	Theme 4) Longhouse
	- How long have you lived in the longhouse?
	- Why did you moved here?
	- How would you describe living in a longhouse?
	- What are the downsides of living in the longhouse?
	- How often do you have to go to the village meeting?
	- How is the collaboration between people living in the longhouse?
	- What are the major challenges that the longhouse is facing?
	- What about the filtered water tank?

SSI (7)

Interviewee	Farmer (3) Diversified Agricultural practices, No titled Land
Location, Date	Informant house Date 4/4 - 2020
Present	Sebrina (Interviewer), Mario (Notetaker) Vanessa (Interpreter)

Interview guide	**Theme 1) Intro**
	- Can you describe your day (activities, transport)?
	- Household info?
	- What activities are you involved in?
	  - Where are you selling your produce?
	  - Price fluctuations?
	- Do you have any income source?
	- Where did you hunt or collect forest produce? Do you share with other villagers? What are the main problems that you are facing?
	
	Theme 2) Land
	- Can you describe the land you have? (NCR or title?)
	- Are you using all your land? Why? Example?
	- Have you ever attempted to get your land titled? Can I ask you why/why not?
	
	Theme 3) Government support
	- Do you currently receive any help from government? If yes, please describe the support (timeframe, process, requirement).
	- Schemes. When and why did you apply?
	- Have you previously received any support or been a part of a scheme? If not, have you ever considered applying for a scheme. Why/why not?
	- Have you been involved in the Tagang project? Why/why not?
	- Are you going to take part in the new bamboo project? Why/why not?
	
	Theme 4) Longhouse
	- How long have you lived in the longhouse?
	- Why did you moved here?
	- How would you describe living in a longhouse?
	- What are the downsides of living in the longhouse?
	- How often do you have to go to the village meeting?
	- How is the collaboration between people living in the longhouse?
	- What are the major challenges that the longhouse is facing?
	- What about the filtered water tank?

SSI (8)

Interviewee	Villager, working as a magistrate for the Native Court
Location, Date	Outside informants bilek Date 6/3 2020
Present	Maja, Katja

Interview guide	**Theme 1: Intro** - Can you tell us a little bit about yourself? - Where do you live and with who? **Theme: Work** - Can you describe your workday? - Where do you work? - What is your job about? - What are your responsibilities and tasks? **Theme 3: NCR land and land code** - Sarawak State Land Code 1958 - Clarification of different section - Why was section 5 removed? - Section 6 & 18 **Theme 4: Survey process** - How does the survey process work? - Are there any costs? - Do you need a lawyer?

B.3. Survey

Bilek	
Gender of respondent	
Head of Household	
Interviewer	
Interpreter	
Note Taker	

Hello, our names are _____. We are conducting a field study here in this village in a collaboration of the University of Copenhagen and UNIMAS University in Kuching. We are here because we are interested in learning about your livelihood strategies.

Therefore, we would like to ask you if you agree to participate in this questionnaire which will be recorded. We ensure that the collected information is confidential and that participants will remain anonymous. You may also withdraw from participating at any point in the process without prejudice. The questionnaire will take about 30 minutes in total.

General information

1. What is your age?_____
   - ❑ I don´t know

2. Were you born in Entebar?
   - ❑ Yes
   - ❑ No

3. Have you lived somewhere besides Entebar?
   - ❑ Yes
   - ❑ No

4. If yes, how long, where and why?
   _____

5. What is your ethnicity?
   - ❑ Iban
   - ❑ Other _____

6. What is your marital status?
   - ❑ Single
   - ❑ Married
   - ❑ Widowed
   - ❑ Divorced

7. How many children do you have?
   Male ____ Female ____

8. What is your highest level of education?
   - ❑ None
   - ❑ Primary School
   - ❑ Lower Secondary
   - ❑ Upper Secondary
   - ❑ College/University
   - ❑ Skill certificate
   - ❑ Other _____

9. Are you currently a farmer?
   - ❑ Yes
   - ❑ No

10. If no, why?
    _____

11. If no, have you ever been a farmer?
    - ❑ Yes
    - ❑ No

12. Have you ever worked for the Government?
    - ❑ Yes
    - ❑ No

13. If yes, do you receive a pension?
    - ❑ Yes
    - ❑ No

Household information

14. How many people are currently living in your household (including you)?
    Female ____
    Male ____

15. Household overview - Parents, children (everyone who lives in the Bilek)

Member	Sex (M/F)

16. Do you receive financial support from family or friends outside Entebar and if yes, from whom?
    _____
    _____

17. Does your household own any of the following?
    - ❑ TV
    - ❑ Air conditioner
    - ❑ Truck
    - ❑ Car
    - ❑ Motorbike
    - ❑ Astro
    - ❑ Smartphone
    - ❑ Refrigerator

Land characteristics

18. Do you have land?
    - ❑ Yes
    - ❑ No

19. If yes in the previous question, how did you get the land? (More than one answer is possible)
    - ❑ Inherited
    - ❑ Bought
    - ❑ Borrowed
    - ❑ Rent
    - ❑ Compensation
    - ❑ Other _____

20. If yes in Q18, how many hectares/acres of that land do you use for agriculture?
    _____

❑ I don´t know

21. If yes in Q18, how many hectares/acres of your land is abandoned? And why?
_____
❑ I don´t know

22. How many hectares/acres of land that you own has a title?
_____
❑ I don´t know

Hunting/gathering (Skip this section if not relevant)

23. Do you hunt?
❑ Yes ❑ No

24. If yes, for what purpose?
❑ Selling ❑ Other _____
❑ Own consumption

25. Do you collect jungle produce?
❑ Yes ❑ No

26. If yes, for what purpose?
❑ Selling ❑ Other _____
❑ Own consumption

Agricultural activity (Skip this section if not relevant)

27. In which activities are you **currently** involved?
❑ Rubber ❑ Fishing
❑ Pepper ❑ Cocoa
❑ Rice (paddy) ❑ Pig farm
❑ Oil palm ❑ Poultry
❑ Fruits ❑ Other _____
❑ Vegetables

28. In which agricultural activities have you ever **been** involved?
❑ Rubber ❑ Fishing
❑ Pepper ❑ Cocoa
❑ Rice (paddy) ❑ Pig Farm
❑ Oil palm ❑ Poultry
❑ Fruits ❑ Other _____
❑ Vegetables

29. Which of the above activities do you consider the most important for you? (Rank three from most important to least important)
1. _____
2. _____
3. _____

30. Which of the above activities do you **financially** consider the most important for you? (Rank three from most important to least important)
1. _____

2. _____
3. _____

31. How do you get to the land listed as the most important in the previous question?
    - ❑ Walking
    - ❑ Motorbike
    - ❑ Car
    - ❑ Other _____

32. How long does it take you to get to your most important activity (if located on more than one plot, mention all)?

    _____

33. Regarding the first chosen activity from Q30, do you depend on additional labour force?
    - ❑ Yes
    - ❑ No

34. If yes, for what occasion?
    - ❑ All year (permanently)
    - ❑ Planting season
    - ❑ Harvesting season
    - ❑ Other_____

35. If yes, who is helping you?
    - ❑ Family members in the Bilek
    - ❑ External hired labour (not family)
    - ❑ Family members outside the Bilek
    - ❑ I don't get the help I need
    - ❑ Neighbours in the Longhouse
    - ❑ Other _____

Fisheries

36. Do you own a fish pond?
    - ❑ Yes
    - ❑ No

37. If yes, for what purpose?
    - ❑ Selling
    - ❑ Other_____
    - ❑ Own consumption

Agricultural Scheme

38. Have you received support from any scheme?
    - ❑ Yes
    - ❑ No

39. If no, have you received other support (subsidy etc.) from the Government?

    _____

    _____

40. If yes, from which agency do you receive help and for which activity?

    _____

    _____

41. If yes, in which form?
    - ❑ Material Support (Fertilizer, Pesticides etc.)
    - ❑ Professional Advisory
    - ❑ Other_____
    - ❑ Financial Support (Loan)

42. List the schemes you have been or are currently involved in:

    _____

_____
_____

Challenges

43. In relation to your current agricultural activities are you experiencing any challenges? If so, what are they?
    _____
    _____
    _____

44. Besides agriculture, what are the major challenges your household is facing?
    _____
    _____
    _____

45. What are the major challenges that the longhouse is facing?
    _____
    _____
    _____

Thank you for your time and participation! Any question?

C :The different land classification from the Land Code of 1958

1. Mixed Zone Land – land that can be held and occupied by either a native or non-native

2. Native Area Land – land other than Mixed Zone Land and must be held/occupied by a native under document of title

3. Reserved Land – land reserved for government use usually comprising of a national park, forest reserve, protected forest reserve, etc.

4. Native Customary Land – land held by natives under customary tenure and created before 1 January 1958

5. Interior Area Land – residue of land not falling under the above four categories.

D. Synopsis

Introduction

The agricultural sector in the province of Sarawak has been highly reliant on cultivating oil palm, and many changes in the past has led to the facilitation of further expansions of this sector (cf. Cramb, 2013). Nevertheless, it seems like local communities try to diversify their livelihoods by engaging in different types of agricultural productions, some of which are supported by the state or private entities through different schemes and other collaborations.

Global demand for palm oil is constantly high and will be high in the foreseeable future (Din, 2017). Currently, oil palm is the single most important crop for global oil and fats production, accounting for 67.92 million tonnes alone in 2017 (ibid). The area of Sarawak alone accounted for 1.56 million hectares, equal to 26.6%, of land used for palm oil production in the same year, indicating that it plays a major role in the livelihoods of a lot of the local communities (ibid).

Yet, another player is on the rise – bamboo. Long considered a "poor man's timber" it gains more and more importance as global demand is rising (Tuah, 2017). It is used for a variety of different products, from medicine, over constructing material, to furniture (Kaminski, Lawrence & Trujillo, 2016). Its positive aspects have been emphasized over the past years and it's said to be a "strong, fast growing and very sustainable material", (ibid). According to the *International Network for Bamboo and Rattan* (INBAR), the global bamboo industry generated 11$US in 2017 alone and is expected to generate even more in the coming years (Tuah, 2017).

After the neo-liberal market reforms starting in the 1980s, Sarawak's agricultural sector has faced a substantial shift. Being mostly reliant on semi self-sufficiency and engaging in swidden agriculture in the past, the focus is more global now. The new agrarian era is mainly attributed to a shift in rights regarding the use of *Native Customary Land* (NCL), which accounts for 60 to 70% of agricultural land in Sarawak (Cramb, 2013). Land, labour, capital and management differ when it comes to the tenure of this agricultural land and there is a large variety of structures, which were and partly still are present in the province of Sarawak, mainly due to the unique concept NCL (Cramb, 2011)[85].

[85] These structures include: "independent smallholders, assisted smallholders, group or managed smallholders (whether in situ or resettled), joint-ventures between private plantation companies and customary landholders, government estates, private estates, and public-private joint ventures", (Cramb, 2011).

By enabling foreign private companies in the form of joint ventures to enter NCL the Government facilitated the access to the much needed technology and knowledge to harvest and trade oil palm in the most efficient way (cf. Cramb & McCarthy, 2016; Cramb, 2012). Today, almost all the land cultivated with oil palm is in private hands, mainly in the form of leases (91%) (Cramb & McCarthy, 2016). Nevertheless, there's still a substantial amount of the population acting as independent smallholders, who are not directly assisted by the Government or private companies (Vermeulen & Goal, 2006).

Global developments and rising demand of bamboo led the *Primary Industries Ministry* (MPI) to review the *Bamboo Industry Development Action Plan 2011-2020* to increase exports of the commodity (Bernama, 2019). The Action Plan includes strategies to establish bamboo plantations and a sustainable management of existing natural resources; human resource and capital development, development of value-added products; research and development as well as marketing, trade and promotion (ibid). Sarawak currently covers most of the national bamboo plantations, accounting for 45%.

The information presented on Entabar implies that members of the Longhouse are involved or have been involved in a lot of different fields of production as well as government schemes. External pressure of the Government has led to the abandonment of prior practices of swidden agriculture and moving places once crop fields are exhausted, resulting in new issues (Cramb & McCarthy, 2016). Based on our current knowledge and insights, the Entabar Longhouse seems to struggle in finding sustainable livelihood practices. Additionally, an increasing amount of young people have moved to bigger cities leaving an aging population behind, putting an even bigger question mark on what the future of the Entabar Longhouse will look like. The village is coming from a long tradition of cultivating hill rice and wet rice, later moving on to rubber plantations, where some parts of the population took part in the *Rubber Industry Smallholders Development Authority* scheme (RISDA). 2006 marked the beginning of intensified oil palm plantations with the introduction of the *Sarawak Oil Palm* joint-venture (SOP). Interestingly, 8 out of the 16 bileks engaging in oil palm production, are part of this joint venture.

As of now, another actor is entering the field: The *Holistic Bamboo Value Chain Investment Project* (HBVCIP). A project, which is in its starting blocks and expected to be implemented by the end of 2020. Literature on this topic is scarce, which could be a difficult

obstacle to overcome conducting our research. Nevertheless, the vast number of different schemes in Entabar raises the question as to why these schemes are implemented there in the first place, and what exactly determines whether the local community is in favor of these and is taking part in them. On another note, it would be interesting to assess the possibilities of bamboo cultivation for the local community.

Research Aim

Our research aim is to explore the different environmental and socio-economic factors that determine if Entabar villagers gain access to and chose to participate in governmental schemes or not. We will base our analysis on the new *Holistic Bamboo Value Chain Investment Project* and compare it to the palm oil joint venture (SOP) and other relevant initiatives. Our research will be grounded in the assumption that the environmental, socal, political, and economic factors are intertwined. These factors may be specific for our area, as well as influenced by larger structures.

Framework

We will analyze our findings using a combination of the *Theory of Access* and the *Sustainable Livelihood Framework* (SLF).

Theory of Access

We are going to use *Theory of Access* to understand, what we assume, as complex structures of access in our area. In the article "A Theory of Access" by Ribot and Peluso (2003), access is defined as the ability to benefit from things. In this case things are understood as material objects, persons, institutions, and symbols. The authors' places emphasis on how benefits may be obtained by other means than property (Ribot, Peluso, 2003, 153). A focus is put on ability, compared to rights in property theory. By doing this the theory can incorporate a range of social relationships that can hinder people to benefit from resources (Ribot, Peluso 2003, 154).

Access is defined broad and access relations are seen as always changing, depending on an individual's or group's position and power within various social relationships. The authors are referring to Ghani (1995) who argues that property should be represented as a bundle of power[86] (Ribot & Peluso, 2003). According to Ribot and Peluso (2003), the different strands

[86] These bundles of powers become nodes in larger webs and, at the same time, can be disaggregated into their constituent strands (Ribot & Peluso, 2003).

in their bundles of power are the means, processes and relations where actors are able to gain, control and maintain access to resources. The different means and processes emphasised in this paper are:

- Rights based and illicit mechanisms, which can be used directly to gain benefits and are determined by law, custom or convention (Ribot & Peluso, 2003).
- Structural and relational factors, which work parallel to the *rights based* and *illicit mechanisms*. They can reinforce access gained directly through configurations of rights-based or illicit access. This could be technology, capital, markets, labor, knowledge, authority, identities, and social relations (Ribot & Peluso, 2003).

Sustainable Livelihood Framework (SLF)

Assessing the livelihoods of people in the area is a difficult task, as livelihoods are affected by various local factors as well as broader, structural processes (Scoones, 2015). In order to be able to compare the different livelihoods, broader frameworks can be used as a tool to grasp the complexity of different contexts. The *Sustainable Livelihood Framework* (SLF) has been widely used as a way to assess the skills, assets and approaches that constitute the livelihood of an individual or, more commonly, a household (UNDP, 2017). Regarding this, a key feature of the SLF is the analysis of five overall types of capital (human, social, natural physical and financial) that can be visualised as a pentagon (figure 1).

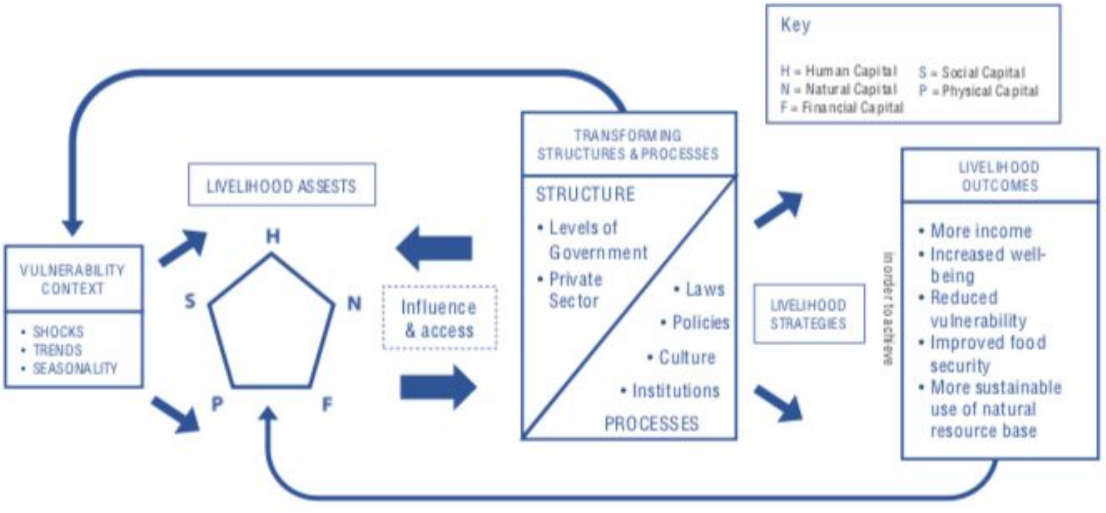


Figure 1. Illustration of the Sustainable Livelihood Framework (UNDP, 2017).

Assessing and comparing the livelihoods of households through the SLF is not unproblematic, yet the tool serves as a straightforward way to approach the complex processes and factors shaping different livelihood strategies in the area. One of the reasons why we find it relevant to use the Theory of Access together with the SLF relates to the household being the unit of analysis in the SLF. By combining the frameworks we can assess different interests and powers within the household, since theory of access places a big emphasis on power (Myers & Hansen, 2020).

Methods

The methods we are applying to answer our research question, are both rooted in social science as well as natural science.

Unstructured interview

An unstructured interview can be considered as a free-flowing conversation (O' reilly, 2012: 120). The interviewer may have an issue, or a theme to address, but the interviewee is given the opportunity to respond in a leisurely way, to disagree, change the topic and add new ideas (ibid.). We plan to use this method throughout our fieldwork, especially in the beginning of the fieldwork in order to get a sense of the field, potential issues and key informants. This could also be a good way of testing whether or not the factors we assume influence the participation in government schemes are relevant.

Questionnaires

We regard a questionnaire as a relevant way to gain information which may support and add knowledge to many of our sub-questions. We would like to get a description of social factors such as gender, income, education etc. as well as details about current and previous agricultural activities, and experiences with and opinions towards government schemes. We are also interested in gaining knowledge about ownership, trust in government etc., as well as the use of production factors such as fertilizers, crop, and labor intensity. We plan on beginning our survey as soon as possible, since it is an easy way to gain access to people.. Considerations such as sampling size (min. 30 respondents), representation, and testing are important before the fieldwork.. We plan on forming a draft questionnaire from home, pilot

test it and adapt it to our theoretical and practical considerations and insights after getting to the field.

Semi-structured interviews

A semi-structured interview can be used to explore ideas with the participants as well as to get fixed responses for some criterias (O' reilly, 2012: 120). We intend on using this method as a way of getting a deeper and more personal account about which motives and factors are dominant in terms of engaging in a government scheme. We intend on investigating different topics that all help to answer our research question. This means we are planning to pursue different key informants such as farmers, government officials, the headman, villagers ect. depending on which sub question to investigate. This method is time consuming for us the translators, and the informant, which means that we may limit this method to key informants. We consider informal interviews, participatory observation, questions and focus groups as crucial in regard to screen for potential key informants to pursue for interviews.

Participatory observation

Access plays an important role in doing participatory observation, and can be difficult to gain since some people find it hard to understand the concept of participatory observation which can sound a little like "spying" (O'reilly 2012: 86-87). It is also important to be aware of your own attributes like sex, age, skin color and social class which can affect the level of access depending on what you want to study (ibid.). Even though our access to the village is fixed before the field study, we will still need a gatekeeper or someone to invite us to join them in order to do participatory observation. We find it necessary to do a overt study, meaning openly explaining the research to our participants, its purpose, whom it is for, and what will happen to the findings, in order to get the participants more willing and comfortable with our presence. We especially hope to join farmers, hoping to get a first hand experience of the workload of labour, labour intensity, field condition while observing the practices regarding land use. It would also be interesting to see if we can gain access to people involved in new government schemes like bamboo, in order to see how this is worked with, negotiated and talked about.

Focus Group

The idea of a focus group is that different people are selected and brought together to share a discussion around a specific topic, with the aim to generate a range of experiences and

responses (O'reilly 2012: 134-135). The method may also be useful for observing how people react to something, how meaning is created in groups, negotiation of conflicting ideas, and body language (ibid.). Facilitating and keeping control of the situation and topic, as well as finding participants may be difficult (ibid.). We would like to use this method to investigate concepts and themes, such as development schemes, land tenure rights, and production, in order to see how the participants perceive and discuss these. Since we don't want to provoke sensitive issues or conflicts, we plan on spending some time in the field testing different issues before deciding how to frame the topic of discussion. How to sample participants will depend on the topic and willingness of locals as well as practical issues such as location, work schedules etc. Since we don't speak the language, and the importance of a facilitator who is aware of what direction the conversation is headed, we plan to do the focus group with approximately 5 participants.

Participatory mapping (PRA)

We plan on using participatory mapping in order to get a conversation started about the source of production, use of landscape, development in the area and who has access to it. We may find it useful to do use a ranking or seasonal calendar as well to add to this information. Depending on time and the possible difficulties of finding participants we may combine this or use the method in our focus groups as well. The mapping can be done in the beginning of the fieldwork to get a personal account of the landscape and as an indicator for potential conflicts and issues, while we consider that the ranking and seasonal calendar will be most useful mid-fieldwork after gaining more insights.

Soil sampling

Soil samples will be conducted in order to explore if we can identify any patterns related to soil quality and other properties of the different agricultural systems. The measures used will be horizontal and volume specific. Ideally, the samples will be taken in OP plots with different ages (e.g. 3 years, 6 years and 9 years). Both joint venture OP plantations and independent farmers OP plantations soils will be measured, together with samples from the future bamboo plots. If the time allows it, we will take samples from other crops as well. The sample collection strategy will be random on the different aged OP plantations.

These considerations are object to change, we plan to observe some soil fertility indicators, such as pH, Soil Organic Carbon (SOC), Cation Exchange Capacity (CEC), Nitrate content, and C:N ratio among others.

Water sampling

Since water is the most important resource for human living, water quality in different sections of Entabar river will be analyzed. Among other factors, according to Tanaka (2009), fertilizer inefficiency regarding different land use practices could decimate the water quality. Stream assessment scoring system (miniSASS method) will be conducted. This is an inexpensive method and relatively fast, where no lab work is involved and that can provide valuable information regarding river water quality.

Other methods

Other methods might be used in our study, since some research priorities can change once we meet and discuss with our counterparts in Kuching. We understand that they might know their environment better and the most relevant topics to work with, and we are sure that an understanding about overlapping interests will be easily achieved.

Ethical considerations

While conducting field work and moving into someone's daily life, asking them questions and analyzing them, it is important to be aware and reflective about your own actions, perspectives and responsibilities (O'reilly 2012: 62,63). How this is going to translate into specific actions during the fieldwork can be difficult to assess, since we assume a lot of situations are going to occur unexpectedly. We plan to discuss these situations when they occur in our field and try to find the most responsible way to move forward and learn from these. One ethical dilemma, which we introduced in the methods, is the awareness of not initiating and provoking sensitive topics that may spark conflicts. We are aware that what we may consider our questions and the things we want to investigate are sensitive or harmless, may be perceived differently by our informants. We plan to navigate in this unknown arena of potential conflict, by relying on and be very humble towards our counterparts, translators or other informants knowledge about the area and the people. Following, a list of other ethical considerations we have discussed:

1. What are our responsibilities towards respondents and hosts?
2. What knowledge do we produce in our analysis? Is this representative?
3. Who agreed to be “investigated” and how do we make sure that our informants feel like they participate in our knowledge production instead of being reduced to objects of knowledge?

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Appendix
Appendix A: Data Matrix

Main research question: What are the factors determining the participation in different governmental schemes? (Think about changing it as more an overall objective?) **Overall Objective:** To determine the main and supporting factors (environmentally, social-economically, politically) of engaging in governmental schemes, such as the palm oil scheme or

the new bamboo initiative, to get a better understanding as to how decisions are made in the longhouse to achieve a sustainable livelihood.				
Sub-questions	**Methods**	**Aim**	**Time-frame**	**Unit of analysis**
Sub 1) What are the motivations and socio economic factors determining the participation in governmental schemes?	Informal interview	To get a sense of the field and potential issues and key informants	Beginning of the fieldwork	Random. To get a sense of the field
	Semi- structured interview	Getting a deeper and personal account on which motivations and factors are present in terms of deciding what to produce.	Mid fieldwork. Key informants or a follow up with respondents/people from questionnaires and informal interviews	Key informant. Mainly someone who is involved with production of crops or government schemes
	focus group	Investigating concepts and themes with point of departure in how the locals perceive and discuss these. May be interesting in terms of observing social relations, interaction and body language for follow up investigation	Mid /End fieldwork as this method takes a lot of planning, negotiating/relationship building with participants, location ect.	No more than 5 people due to potential issues with facilitation and translation. May be random picking or more deliberate depending on what is possible.
	Questionnaires	To investigate social factors (gender, income, education ect.) and their correlation with crop production and government schemes.	Beginning of fieldwork. Sampling depends (we will see)	Minimum 30 respondents. we would like more, in terms of representation and testing the questionnaire.

Sub 2) What are the main sources of crop production and how has this developed over time?	Participatory mapping and Seasonal Calendar GPS Questionnaires	To get a conversation started about source of production, the landscape, the development and who has access. Ranking of land (PRA) may be useful as well.	Beginning of fieldwork, depending on access to key informants. My be a good indicator in the beginning of fieldwork, as well as a "follow up" exercise end field-work	May be individual mapping or in groups (no more than 5 people). Depending on what is possible
Sub 3 shaped as two different hypothesis. 1) Soil fertility is affected by long term schemes intensive agricultural practices. (Palm oil as point of departure) 2) Landscape affects joint ventures decisions whether or not to participate.	Soil sampling methods GPS mapping Water sampling Questionnaires Participatory observation	Assess different soil parameters, trying to evaluate the potential changes in soil fertility during time, and compare them with primary or secondary forests and with the future bamboo field. In order to have an accurate perception of Entebar area, we would To find out if there is a water quality reduction in different parts of the Entebar river. To investigate different factors as use of fertilizers, labour intensity, pesticides To get an first hand experience of the workload of labor, labour intensity, field condition while observing the	Mid-late fieldwork. The chance of having heavy rains that can make the work difficult will be lower, since it is the end of the rainy season. Besides, some data will be obtained in Denmark, so there is no real hurry. Beginning of the field work in order to get a general perception of the area, size, distances, Mid-late fieldwork. Same reasons as for the soil sampling methods. Beginning of the field work Depends on access and the negotiation of this. would be	pH, nitrate content, salinity, C:N ratio, CEC, texture, SOC, NPK. pH, stream assessment scoring system (invertebrates). Depends on the situation. We will definitely need a gatekeeper

		practices regarding land use. Measure field slopes	good to do throughout the fieldwork, and with different farmers.	though.
	Clinometer		Early/middle field work	Slope percentage
Sub 4) What are the benefits and/or issues that villagers face in their engagement in government schemes? Sub 5) How does previous engagement in other governmental schemes influence their perception of the palm oil scheme or other future schemes?	Questionnaires Interviews Possibly focus groups Participatory observation	To get an overview, as soon as possible,information regarding ownership, political affiliation, trust To go more into depth with reference to results from questionnaires Might be relevant depending on what we would like to investigate How is the new schemes like baboo negotiated and talked about?	Beginning of fieldwork. Mid/end. Mid/end	Have not decided on sampling method yet. Key-informants, possibly headman, government officials, villagers.

Appendix C: Focus group draft

Focus group (draft)

Practicalities

Facilitator: Lead the conversation, activities in collaboration with the interpreter
Observer/notetaker: Make a sketch of where the participants place themselves, how they talk together and their names. Record while taking notes.
Interpreterer:

Participants:
Information needed:
Name, age, occupation, etc.

1)
2)
3)
4)
5)

Theme 1) Development in the area

Exercice: Make a collaborative mapping of the area. Where do you spend most of your time, does this differ within the group - why do you think that is?
Discussion: **What is development?**

- How do you see yourself in 1 year from now? - Are you working with the same as now ? what about one year ago?
- What is the most important development in the area -

Theme 2) Farming and production
Exercice: Ranking of crops and assets in order to produce the different crops

Discussion: What is vulnerability ?

- Seasonal change?
- labour intensity ?
- Climate change?

Theme 3) Acces, expectations for the future

Exercice: What part does government projects play in your choice of production? **Experience vs. expectations? - Post -it session**

Discussion: Why do you produce what you do?
What is your ideal occupation?
What does this require?

Appendix D: Semi-structured interview draft

Semi- structured interview

This draft is more a guide on how we plan to do our semi-structured interview in the field, knowing that this will change and be adapted depending on our informants, our gain of knowledge, and focus.

This is an example of looking into the development in the area regard to government scheme*- This draft is meant for someone who is involved in a government scheme either oil palm or bamboo. It is more thematic that specific.

Descriptive

Your name
Age
Occupation and education

Theme 1) Development in the area

- How long have you lived here?
- can you give an account of the history of the area ?

- What do you understand as the main change in terms of development and agriculture in the area?

Theme 2) Farming practices.

- What farming are you currently involved with - have this changed? why?
- Can you describe your day - what do a normal day look like? (keywords)
- Why do you farm that specific crop, benefits, doubts, insecurities?
- Is the road/infrastructure important?

Theme 3) Government schemes, trust, experience.

- What are the motivation for participating in government schemes - expected outcome?
- Do you have any experience with participating in previous government schemes - can you give an example ? Negative, positive neutral?
- How was the process - previous process ? and which considerations did you have?

Appendix E: Survey

General information just for us to fill out:

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

Hello, our names are _____. We are conducting a field study here in this village in a collaboration of the University of Copenhagen and UNIMAS University in Kuching. Our main objective is to

Therefore, we would like to ask you if you agree to participate in this questionnaire which will be recorded. We ensure that collected information is confidential and that participants will remain anonymous. You may also withdraw from participating at any point of the process without prejudice. The questionnaire will take about ____ minutes in total.

General information

1. What is your gender?
   - ❑ Male
   - ❑ Female
   - ❑ Other

2. What is your age?_____
   - ❑ I don´t know

3. Place of birth?: _____
   - ❑ I don´t know

4. Where do you live now ?:_____
   - ❑ I don´t know

5. What is your marital status?
   - ❑ Single
   - ❑ Married
   - ❑ Widowed
   - ❑ Engaged
   - ❑ Divorced
   - ❑ Separated
   - ❑ Other

6. Please state your relationship to the head of the household:
   - ❑ Head of household Husband
   - ❑ Wife or Parent of the head of the household
   - ❑ Sibling
   - ❑ Child
   - ❑ Grandchild
   - ❑ Other family member (includes household helpers) specify_____)

7. What is your highest educational level ?
   - ❑ Preschool
   - ❑ Primary education
   - ❑ Secondary education

- ❑ Post- secondary education
- ❑ Tertiary education
- ❑ homeschooling
- ❑ university

8. What is your primary occupation ? (Please pick one)
   - ❑ Farming
   - ❑ Service sector
   - ❑ Tourist industry
   - ❑ Manufacture industry
   - ❑ Unemployed
   - ❑ Transportation
   - ❑ I don't know
   - ❑ Other _____

Household information

9. Do any members of your household live outside of Entebar (permanently living elsewhere)
   - ❑ Yes
   - ❑ No
   - ❑ If yes, how many? _____

10. Do members of your household contribute financially to the household?
    - ❑ No
    - ❑ Yes,

Member	Through what activity?

11. Something about income sources,

12. Do you own any of the following?:
    - ❑ Phone
    - ❑ Tv
    - ❑ Agricultural machinery
    - ❑ Tractor
    - ❑ Truck
    - ❑ Motorbike
    - ❑ Car
    - ❑ Bank account
    - ❑ Stove
    - ❑ Refrigerator

Farm characteristics

13. How much land, in hectares/football fields/number of trees, belongs to the HH at the current moment? _____ (Discussion with UNIMAS students)

14. What crops are you currently cultivating?
    _____

15. Which of these crops are used for subsistence and which are sold?
    _____

16. What do you consider the most important crop/what generates the most revenue?
    _____

17. How intense is the cultivation of this crop?
    _____

18. How **are** or **have** you been assisted by the government or private companies?
    _____

19. Which of these are still in "action"?
    _____

20. Do you have your own private smallholder oil palms?
    - ❑ Yes
    - ❑ No

21. How much land are you currently leasing to oil palm JV? _____

22. Which year do you expect to start receiving dividends from JV OP, if ever? _____

23. Are you concerned with any of the following issues regarding the land leased to oil palm joint venture? You may choose from 0 to all.
    - ❑ Degrading soil quality
    - ❑ Water pollution
    - ❑ Security of getting back the land leased
    - ❑ Other _____
    - ❑ None of the above