Last time and now: Sustainable development in Linsat?

A case study of the environmental and socio-economic impacts of development schemes in Linsat Batu Kudi, Sarawak

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Abstract

The objective of this report was to answer the problem statement, by discussing the various socio-economic and environmental impacts SALCRA have had on the small rural community of Linsat, as well as how these impacts corresponds with the villagers own perception prior to the scheme's implementation. These impacts and perceptions was also put in relation to the concept of sustainable development.

Our results indicates that the relationship between the development schemes and the villagers is ambivalent and dynamic, and the specific impact on socio-economy likewise. However, it is evident that the mere concept and discourse of development is influencing village livelihood and perceptions, which in this report is exemplified by their declining forest use and strong emphasis on modernisation through improvements of facilities in the village. The environmental impacts are especially visible by the continued deforestation, related to plantation expansion. These impacts have been assessed through soil analysis and forest resource assessment in triangulation with social science methods.

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0. Acknowledgements

This report has been made during the SLUSE course at the University of Copenhagen in cooperation with UNIMAS. It mainly consist of data collected during field work in the village of Linsat Batu Kudi in Malaysia.

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We would also like to thank the staff responsible for the course at Copenhagen University and UNIMAS for making this field work possible in the first place and for being available throughout the field work.

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Special thanks to our translators, Cecilia and Alvin, for always being willing to help during the fieldwork, despite the challenges and difficulties which can occur when translating.

THE MYTH OF BATU KUDI

There was a longhouse in Linsat who was having their festive season and event. And there was an old lady, a grandma, and her grandson, and they were staying at a hut nearby the longhouse because they were poor and had some disease.

The grandson and grandmother were hungry and the grandmother asked the grandson to ask for food from the longhouse folk. But the longhouse folks were giving him packed food to bring back home. When he returned to his grandmother he found out that the packed food was actually a poop. So the grandmother became very sad and angry. Then she got a cat and dressed the cat to wear a shirt and pants and put on the necklace, which is made of smoked fish. She asked her grandson to bring the cat back to the event at the longhouse and then all of the longhouse people guests were laughing at the cat.

Then suddenly it was raining heavily and the longhouse and its people turned into stone. Only one lady was not turned fully into stone, but only until the neck, because she was wearing a necklace and earring made of gold.

So then it took a few months for the nearby villagers to feed the lady with food as she was always asking for food. At the end the villagers decided to take off the necklace and earring, and only then, the lady was turned fully into stone.

Then the grandmother and her grandson were running away but at a certain distance, both of them were turned into monkeys, *Adau*. This place where they turned into monkeys is out by the Merbau hill and in Linsat village it is called *'Tinting Adau'*. In *'Tinting Adau'* there are two stones in the shapes of monkeys.

1. Introduction

Upon arrival, we were almost at first stance introduced to the myth of Linsat. It was presented to us as a sort of genesis, the mulch from which this small village in the hilly area of Merbau[1] germinated. The myth gave an interesting preliminary insight to the villagers' perceptions and lifeworld. Imagining how the old longhouse turned into the rock face on the hill of Batu Kudi, which rises over our temporary home in the community hall, to us seemed like a fantastic transformation and curious representation of change. Concepts such as change, history, moral and ethics are all assembled in this myth, which showed to be a constant point of reference in a present likewise dominated by large changes in physical features of the land and for the people inhabiting them. It is in this assemblage of present and past that we have tried to navigate throughout the fieldwork in order to assess the impacts and perceptions of development and development schemes in Linsat.

Linsat Batu Kudi (henceforth referred to as Linsat) is a small Iban Remun village consisting of 41 households and located in rural Sarawak 24 km from Serian. During the past decade the village has taken part in the large oil palm development scheme, Sarawak Land Consolidation and Rehabilitation Authority (SALCRA), and has in 2015 initiated a collaboration with the rubber scheme, Rubber Industry Smallholders Development Authority (RISDA). As RISDA is still in the initial phase, the main focus on the impacts of development schemes will be on SALCRA.

The land use changes in Linsat are far from unique. In most of rural Sarawak, land conversion to plantations of oil palm and rubber is increasingly common. The high global demand for palm oil has made it a lucrative crop, and Malaysian export of palm oil is steadily increasing (Index Mundi 2016). Regional development schemes such as SALCRA can be seen as a way to ensure the government's wish to increase production in rural areas through conversion of the land to large-scale plantations. The scheme also promote socioeconomic development by issuing land titles and offering a dividend of the profit (Wilms Posen, et al., 2014: 3; Banerjee & Bojsen, 2005; SALCRA 2016a). However the outcome of this broad development initiative has been called into question both in terms of ambivalent livelihood impacts and pressure on biodiversity, reduced soil quality and spurred deforestation (Wilms Posen, et al., 2014: 3; Mertz, et al. 2012: 110). In the following case study these socio-economic and environmental impact flows will be discussed with particular focus on the villagers' perceptions, SALCRA's development statements and how all this can be understood in the light of the concept sustainable development.

[1] Merbau, or Bukit Merbau, meaning hills of Merbau, is the common name for the now separate but neighbouring villages of Meboi, Junggu Mawang & Linsat Batu Kudi

Some academic attention has been paid to how different aspects and discourses of sustainability plays together (e.g. Adams 2009; Willis 2009+2011; Giddens 2011) , as well as the link between 'sustainability' and 'development' (Gore 2015) but theoretical literature on sustainable development is often less attached to how such discourses plays out at a local level. Thus we wish to discuss how the concept of the term 'sustainable development' as presented by literature and used by SALCRA corresponds with the villagers of Linsat's perceptions on development. In this we discuss the different domains' (social, economic, environmental) interrelations, interdependency, contradictions, and perceived harmony with analytical point of departure in the following problem statement:

1.2. Problem statement

How does SALCRA affect environment and socio-economy in Linsat and how can the different perceptions of these impacts be understood in light of the concept of sustainable development?

1.3 Research questions

1. What land use and livelihood changes are occurring in Linsat as related to the development schemes?
2. How do these changes affect the environment, and how are these environmental changes perceived by the villagers?
3. What are the socioeconomic impacts of the schemes, and how are these perceived by the villagers?
4. How do the villagers' perception of changes and impacts relate to the concept of sustainable development as defined by SALCRA?

1.4 Clarification of key concepts

In our assessment of the impacts of SALCRA, we operate with the two categories environmental impacts and socioeconomic impacts. Both terms are broad umbrella terms which can be ascribed a range of factors, but we have delimited ourselves to the following:

Regarding ***environmental impacts*** we focus on the indicators of deforestation and its connection to biodiversity loss, which relates to the changes of what was before the plantations versus what is now. Secondly we focus on soil fertility in order to assess the current environment after this change.

In this study, socio-economy encompasses economic behaviour in relation to various social structures. In following analysis the focus on ***socio-economic impacts*** focuses on the behaviour behind the villagers' economic actions and political decision to join SALCRA. The term thereby encompasses both social, economic and political processes and how these influence each other (Schlüter & von Detten, 2011).

The concept of ***livelihood*** will also be recurring, where we draw on Ellis' definition of the term: "the assets (natural, physical, human, financial and social capital), the activities, and the access to these (mediated by institutions and social relations) that together determine the living gained by the individual or household" (2000:10). We also refer to Ellis' (1993:14) definition of ***household*** as; "A social unit defined by the sharing of the same abode or hearth […] within the household resources are pooled, income is shared, and decisions are made jointly".

Lastly, a key analytical concept is ***sustainable development***, which we understand as a hybrid of environmental, social and economic objectives and impacts related to changes in land and land use. However, we also understand the concept as dynamic and as a capsule for various meanings and objectives. Sustainable development is used in various ways in this report; firstly it is used as an analytical point of departure to organise our collection and processing of data; secondly, the term is discussed in relation to SALCRA's homepage which contribute to the discussion of our findings on a more abstract level; and thirdly, perspectives on sustainable development from literature is included to qualify the discussion on a more theoretical level. This multiple usage relates to our methodology as described in the following section.

3. Methodology

3.1 Analytical framework: a case study

Our case is a result of a complex combination of abstract experimenting thoughts, specific events, concrete experiences, and aggregated generalizations if we are to follow the social science terminology used by Lund (2014). It is the awareness and understanding of movements between these domains, and in the idea of a circular rather than linear research process that we become conscious of which case we are dealing with (Lund 2014:225; Cramb 2007:252). With inspiration from hermeneutical method of interpretation we have constructed this case continuously by highlighting certain particularities in the field which we saw as supportive of our focus; moreover we have asked about certain themes subjects with the more or less implicit agenda to get information about the case we were in the middle of constructing, while the answers to these questions again affected our focus (Collin & Køppe, 2005: 140-150). In this sense our strategy was a mix of inductive and deductive research but with the ideal to keep it explorative.

Going with Lund's (2014) distinction between a microcase and an aggregated abstract case, it can be said that our study is a bit of both. The microcase is understood as a relatively discernable, concrete and specific set of events or problems, related to the development schemes' entry and presence in the village, together with the associated land and community changes, which will be unfolded in section 4. The concrete and context-dependent knowledge is, according to Flyvbjerg essential for research and learning, so that theory does not develop as "epistemic theoretical construction[s]" but are informed by practice (Flyvbjerg, 2006: 4).

Building on section 4, we move forward in section 5. into the more abstract and aggregated dimension of our case, which in a social science perspective is what makes it that much more interesting (Lund 2014:224). The section comprises of concrete observations in relation to natural science surveys complemented by more abstract discussion of how these impacts are perceived. The same complementary structure is at play in analysis section 6., where we look at the socio-economic impacts of SALCRA, and the various attitudes expressed towards these. Furthermore we will include reflections on engaging in the RISDA scheme, to put the opinions towards SALCRA in perspectives.

The last part of the analysis, section 7., strive to show how the impacts and perceptions, discussed in the previous sections, can be understood in the light of sustainable development as political tool and theoretical hybrid. Thereby we establish and conceptualize the case analysis in a concluding but at the same time provoking reflection. This more abstract dimension of our case were already surfaced in the field, where it quickly became evident that our informants understood themselves and their surroundings as part of or involved in some kind of development.

Thus, the analytical strategy has been to move from the specific and concrete to considerations about the more abstract, theorizing and general perspectives while the same time letting these dimensions play together and acknowledge that they are interdependent.

3.2 Perceptions, expectations and meeting with the field

We have sought an inductive and explorative research approach, striving to let the field guide our research focus. However, despite efforts to meet the field with openness, the cultural encounter between us and the villagers, but also our student counterparts and translators, naturally brings along certain challenges and misunderstandings. These were not foreseen before the encounter, which relates to Hastrup's point that "In the field, we are presented to answers to the questions that we did not yet know we had to ask" (translated from Danish, Hastrup, 2010: 41). Our question about which land use change had occurred, serves as an example of a question we saw as open but at the same time was bound to our pre-understanding of the consequences of plantation expansion. The answers to such questions pointed in many different directions such as individual perceptions, economic impacts, agricultural practice in general, and so forth.

Another key communicative difference was with regards to perceptions of time, where the villagers would rarely refer to the past as "20 years ago" but instead use expressions such as ''before'', ''last time' or' with reference to periods in their lives such as "When I was a child". The time aspect was of particular importance as we in our analysis were mostly interested in the changes happening after the introduction of the development schemes approx. a decade ago. We found that the focus on an isolated period of time often did not prove meaningful, and we

thus had to adjust our ways of asking as well as be open to how the changes in recent years forms part of a larger narrative where the present is seen in relation to a different past.

We also experienced people were very polite, which at times meant that we felt like we were not corrected in misassumptions; if we for example by accident asked leading questions such as “is that fallow land?”, we would often be confirmed, but without knowing if this was because it was true or if it was recognition for saying an Iban word. Furthermore, the language and culture barrier means that words may not only be lost in translation, but may also mean completely different things to different people. Due to this, we put an effort into asking how the villagers understood key concepts such as “development”, “forest”, etc.

3.3 Interdisciplinarity

Our academic background ranges from anthropology to geography, environmental economics, agricultural- and international development; which are disciplines that in themselves can be understood as interdisciplinary. However, our group has a preponderance of social scientists, which is mirrored in the prioritization of methods.

Despite the lack of natural science capacity we have strived to have an interdisciplinary approach to our case, both in the construction of important problems and in the data processing, where natural science methods especially serves to support the expressions and verify the claims held by villagers regarding the environment. The outcome of the findings from both qualitative and quantitative data get its relevance and value only by virtue of interaction and triangulation. Thereby the methods in this interdisciplinary field study are both complementing and interdependent.

3.4 Key methods

An overview of all the methods applied throughout the field study is provided in Appendix 1. This section will briefly touch upon some of the qualitative and quantitative methods that turned out to be of particular relevance, either because of advantages or important shortcomings.

The different conducted PRA’s comprised of both time related, space related, and relational methods; these dimensions were of preliminary interest and also turned out to be of particular importance during the fieldwork and in the subsequent data processing. The concept of focus group interviews was embedded in the PRA sessions. A shortcoming was the small sampling pool where same informants participated in various PRA sessions. Especially group discussions during PRA were useful in capturing dynamics and negotiations, that cannot be observed in individual interviews. However, in our case curious villagers randomly joined the individual interviews. This both has its pitfalls and advantages. The opinions expressed in groups often reflect what the participant thinks is appropriate to say, therefore extreme or controversial attitudes are less likely to be expressed. Therefore it was important to continue trying to triangulate in depth individual interviews and participant observation. Participant observation

was a continuent method that directed our research focus and selection of informants. The challenge in this and the other social science methods conducted was to balance our double role; we were part of the situations we tried to observe, while at the same time contributing to create them. General for all these methods is that the opinions expressed are circumstantial and contemporary; the environment can shape and alter understandings and expressions in situ.

Triangulation has moreover been important in relation to the more quantitative methods. The selection of soil sampling sites was a challenge, but the interplay between historical mapping, timeline and GPS helped us select the sites in collaboration with key informants. The use of GPS made the picture of land use change more nuanced, e.g. we discovered that SALCRA was not a specific delimited area only with oil palm. The land use changes, were blurry, overlapping and ambiguous in their boundaries. This discovery was also important for our understanding of why it was sometimes difficult for the villagers to answer our category specific questions about size and landscape transitions. The questionnaire gave an important overview of the attitudes towards land use change and development schemes. A shortcoming was, that the categories constructed were sometimes in contradiction with the perception of the respondents. Some of the shortcomings were mitigated in pilot testing and analogously as they were discovered. Others represented a somewhat unavoidable shortcoming in questionnaires, namely that they tend to give a static impression of a dynamic reality, why it is crucial to triangulate with other qualitative research tools.

4. Case context

4.1. Development schemes in Linsat

The parameter survey and clearing of land for the SALCRA oil palm plantation started in 2006-2007 and the planting was conducted in 2008 (Timeline, SSI Headman). The scheme forms part of a national strategy of converting traditional agriculture to cash crops plantations (Cramb 2007:27). As most suitable state land has already been allocated to commercial plantations or belongs to private owners, the state sees Native[2] Customary Rights Land (referred to as NCR land henceforth) as the next expansion possibility (Ngidang, 2005). NCR land was implemented in 1958, as way of protecting existing native customary land from non-native acquiring of land titles (Ngidang, 2005). In practice NCR land is held by licence from the state unless there is a document of title on the land (Cramb 2011:282). In order for SALCRA to cultivate NCR land the native landowner has to agree (Cramb 2007:269, VP). A result of this, has been that native landowners of NCR land, are under increased political pressure to engage

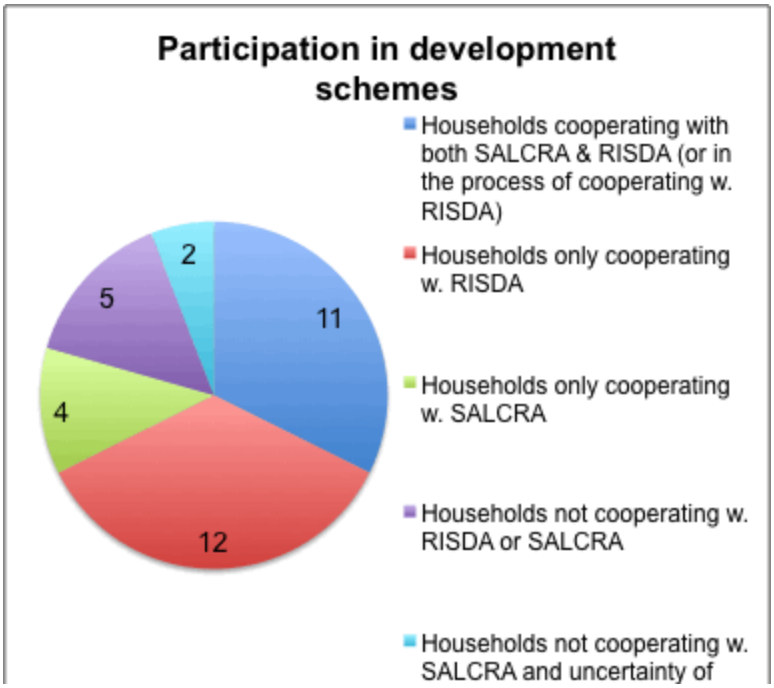
[2] Natives in this instance refers to various indigenous groups, such as Dayaks (including Iban) and Malays

in large-scale plantations (Ngidang, 2005). According to our village profiling all land in Linsat is NCR land (VP)[3].

According to the headman, there were no pressure to engage with SALCRA and the final decision of joining was an "agreement between husband and wife" (SSI Headman). The landowners' agreement with SALCRA was a 25 year based contract, where SALCRA had permission to clear the concerned land and replant it with oil palm. After the 25 years the contract expires the landowner gets an official legal land title on the former SALCRA plantation (SSI Headman, VP). Moreover the landowners engaging in the scheme were promised a dividend of 30%, 5-6 years after planting (from 2008), which is when it was deemed that the surplus from the palm oil would cover the expenses for the initial clearing and construction of roads (SSI5, SM).

In addition to the SALCRA scheme, 23 villagers has joined the rubber scheme RISDA in 2015 and some are still in the process of approvement (see fig. 1) (VP, SSI2, Q data). At the time of our fieldwork, RISDA was in the phase of clearing the land for new rubber (Transect 2&3, General OBS). Other than development schemes, the government also provides different economical aids as brim and pension (SSI2, Q data, VP).

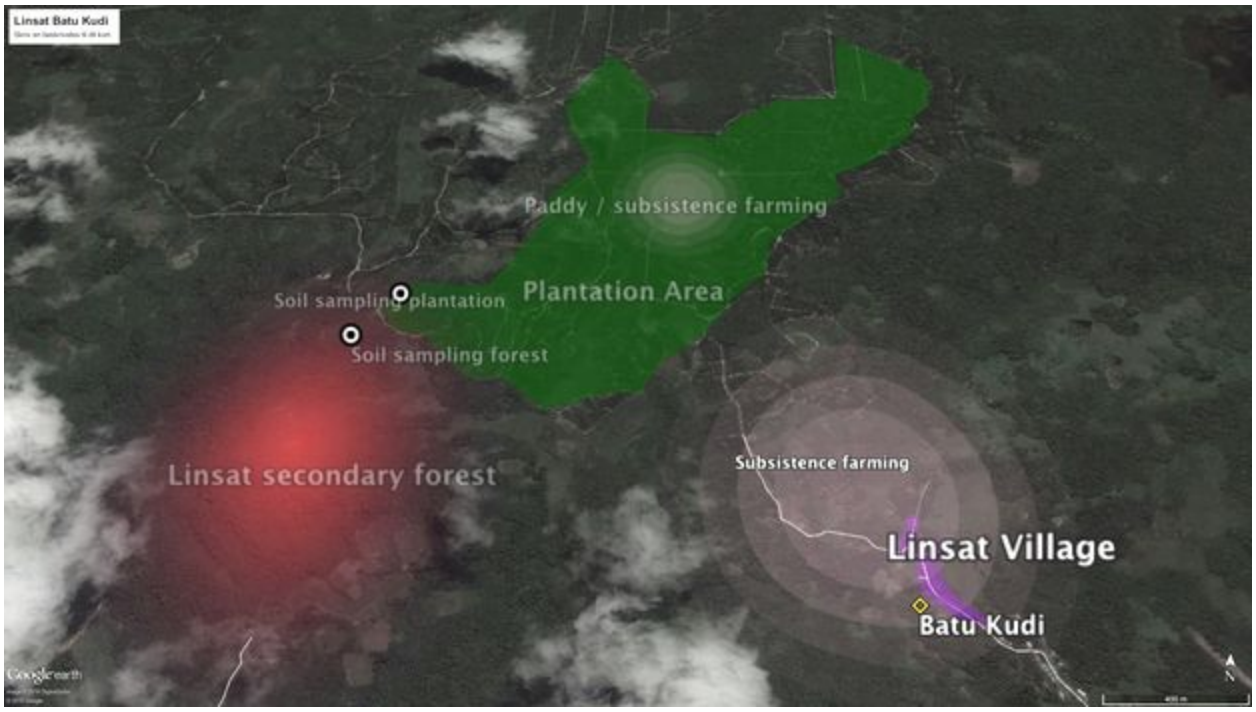
Figure 1



The headman informed us that almost everybody with land collaborates with SALCRA (SSI Headman; SSI5). However the questionnaire shows that of the 34 respondents, all have land, but only 15 were cooperating (Q data). Whether the inconsistency between the data is due to an overestimation by the headman or biases in the questionnaire, is hard to tell.

[3] In our questionnaire seven respondents said that they had land titles. This is perhaps due to the conflicting nature of NCR land, and the way the concept of land title and owning land is perceived differently by the villagers themselves than the standardized legal perception.

4.2 Land use changes related to the schemes



Map 1

The SALCRA plantation, is shared between the three Merbau-villages, Linsat, Meboi and Junggku Mawang on what is called phase 5. located NNW of Linsat (Plantation ride). The plantation consists of 423,84 ha adjacent to secondary forest and the borders of Antayan [4] and Tabung Haji[5], and starts 600 meters NNW from Linsat (Map 1)(GPS data). Even though SALCRA oil palm plantations are occupying most of the area demarcated for the scheme, we saw a variation of fallow land, rubber, paddy fields etc. – all within, and close to, the SALCRA plantation area (PT). This diversification within the SALCRA plantation shows that the villagers only leased out a part of their land when they joined SALCRA, thereby keeping some of it for other purposes (SSI Headman). This can be seen as a part of a livelihood strategy not relying all the livelihood on the oil palm as a way of minimizing risk. Though the currently most cultivated crops in Linsat are the cash crops oil palm and rubber (Q data), we found out that wage work and different kinds of subsistence resources such as paddy cultivation, NTFP's, etc. are important contributions to the livelihood of all the villager's (Q data). In addressing the socio-economic impacts of SALCRA and oil palm plantation expansion it is important to stress that despite the increasing cash crop cultivation, the villagers in Linsat have a very mixed economy where subsistence economy and cash crop both adds to the overall household economy.

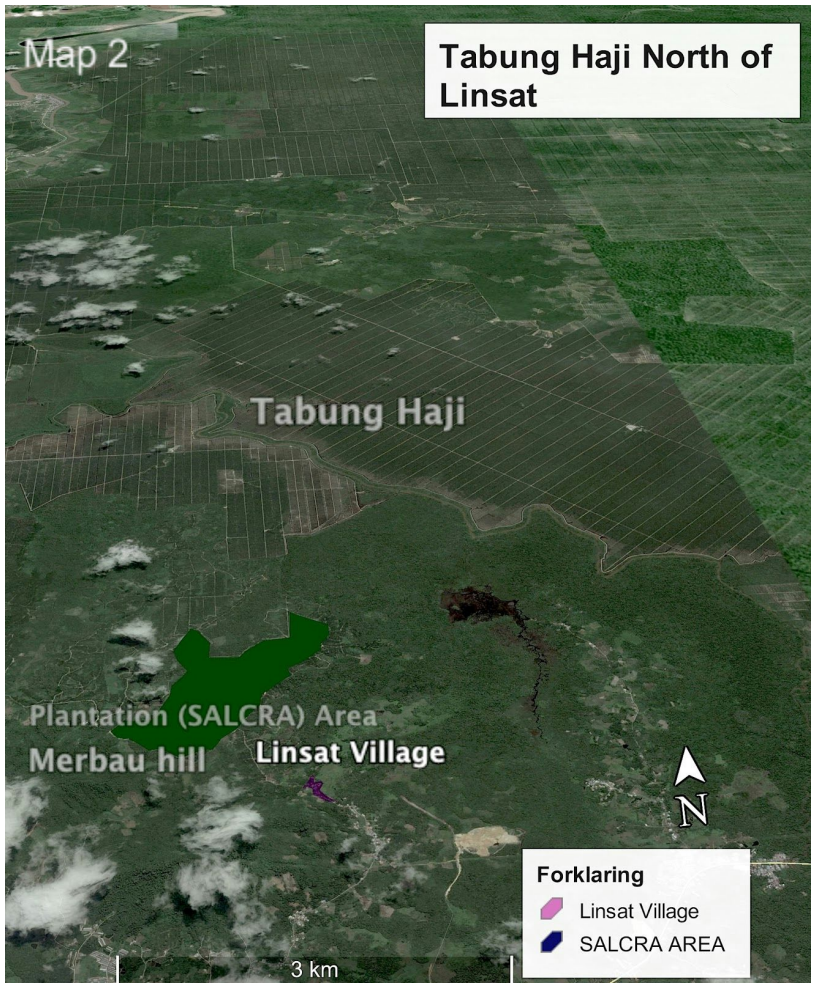
[4] Nearby village
[5] Private large-scale oil palm plantation

5. Environmental impacts of SALCRA

5.1 Plantation expansion and 'Empty land'

Over the past decades, many areas around Linsat has been converted to large scale oil palm plantation such as the huge private plantation area of Tabung Haji north east of Linsat and the SALCRA plantation area. In the areas just north west of Linsat, SALCRA has gradually cleared land for oil palm since 2006 (HM).

Several villagers, among others Norina, seems to believe that the plantation expansion will increasingly dominate the landscape: "They [SALCRA] will change swamp and *tanah kosong*[6] to oil palm" (SSI1). Her husband on another occasion, when asked about what will happen to the remaining forest land in the future, answered: "I imagine that in 10-20 years there will be no forest left, only plantation. Palm oil or rubber" (SSI4). Not only SALCRA seems to be causing the clearance of the land, but currently RISDA also seems to play an important role. As put by Rentap: "I think RISDA is expanding much more rapid with land clearance than SALCRA. In the beginning SALCRA cleared land manually without machines. RISDA had machines and used them from the start" (SSI4). We were also told that "for the second phase of RISDA it will go up until the Merbau hill, if the land survey confirms" (SSI2).



[6]Iban term translated to 'empty land'

The above outlined details about the plantation expansion and the deforestation happening on its account, was not something we became aware of at first stance. On forest walks as well as on the plantation tour, we would point towards jungle-like areas and ask “what is that?”, and we would get answers like “that is nothing” or “that is empty land” (*Tanah kosong)*. The description of jungle and forest as “nothing” and “empty” was puzzling to us, since it in our perception was the complete opposite. ‘Empty land’ became indicative of a dominating approach among the villagers to forest areas, as the term connotates that if the land is not cultivated it is ‘nothing’ or has no direct value. This rather utilitarian or pragmatic approach to land was reflected in several expressions, among others a woman who responded the following to our questions about what she thought about the land changes; “It is good with the schemes, it helps economy. Cleared land is for planting, it is good” (SSI6).

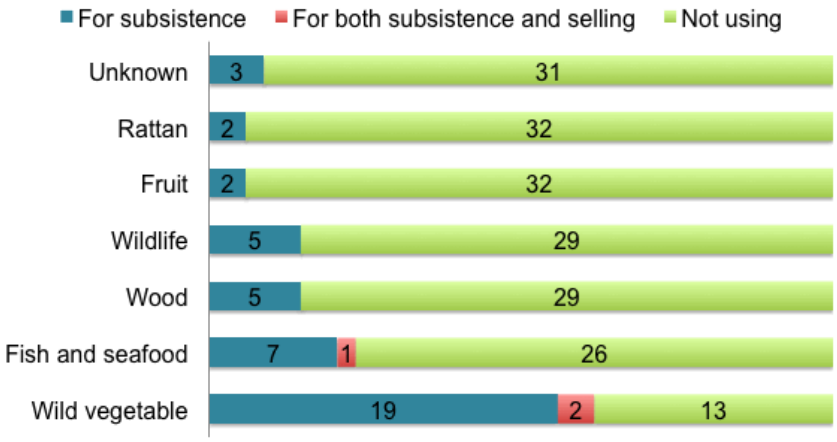
The villagers also have a positive perception of SALCRA because the collaboration means they don't have to do the hard work in the field, since hired labour will do it for them (SSI4; Transect 2). Some villagers mentioned parts of the SALCRA area used to be cultivated with hill paddy and pepper, but as it was “very far to carry”, they “gave” it to the SALCRA scheme (HM).During the historical mapping no one expressed that the establishment of the SALCRA plantation challenged their forest use. In another interview it was stated that the plantation expansions did not affect hunting activities or collection of wild veggies (SSI3). It seemed like as long as the deforestation didn’t threaten their livelihood security, neither past nor continued forest clearance was a dominating concern for the villagers. When the plantation expansion in general was discussed with Rentap, and we asked what he thought about this, he answers: “I think it will become difficult to find animals to hunt” (SSI4). This attitude is related to the lack of food availability rather than sentimental expressions about the deforestation and conversion of land. However, on another occasion the same man expressed that; “I liked and still like to walk in the forest and hunt, or just walk alone, that is where and how I learned everything” (SSI4). This statement surfaced late in this particular interview where we asked more biased questions about feelings towards the forest. Even though the situation was

relatively manipulated, we got more insight as to how the villagers have been living close to and used the forest for generations, which he elaborated afterwards. Now this space where they learned about medicine use and hunting etc. is continuously reduced due to deforestation.

5.1.2 Use of forest resources

There is no clear cut answer as to how the use of forest resources has been affected by the development schemes, and the villagers perception of the impacts varies within and between statements.

Figure 2
Number of households using forest resources
(compared to total of 34 households)



Some households seemed to rely more on forest resources, especially when these resources constituted a part of their income. In one household, it was explained that when they were in debt and had a tight economy they were more dependent on forest resources:

> "I could not just buy things for the kids, I had to not spend it. I had to struggle to find the wild veggies and clams to sell. I go to SALCRA [plantation area] for the wild veggies, and sold it to nearby villages, but sometimes I could not sell it all and if it was more than we could eat, I had to throw it away" (SSI3).

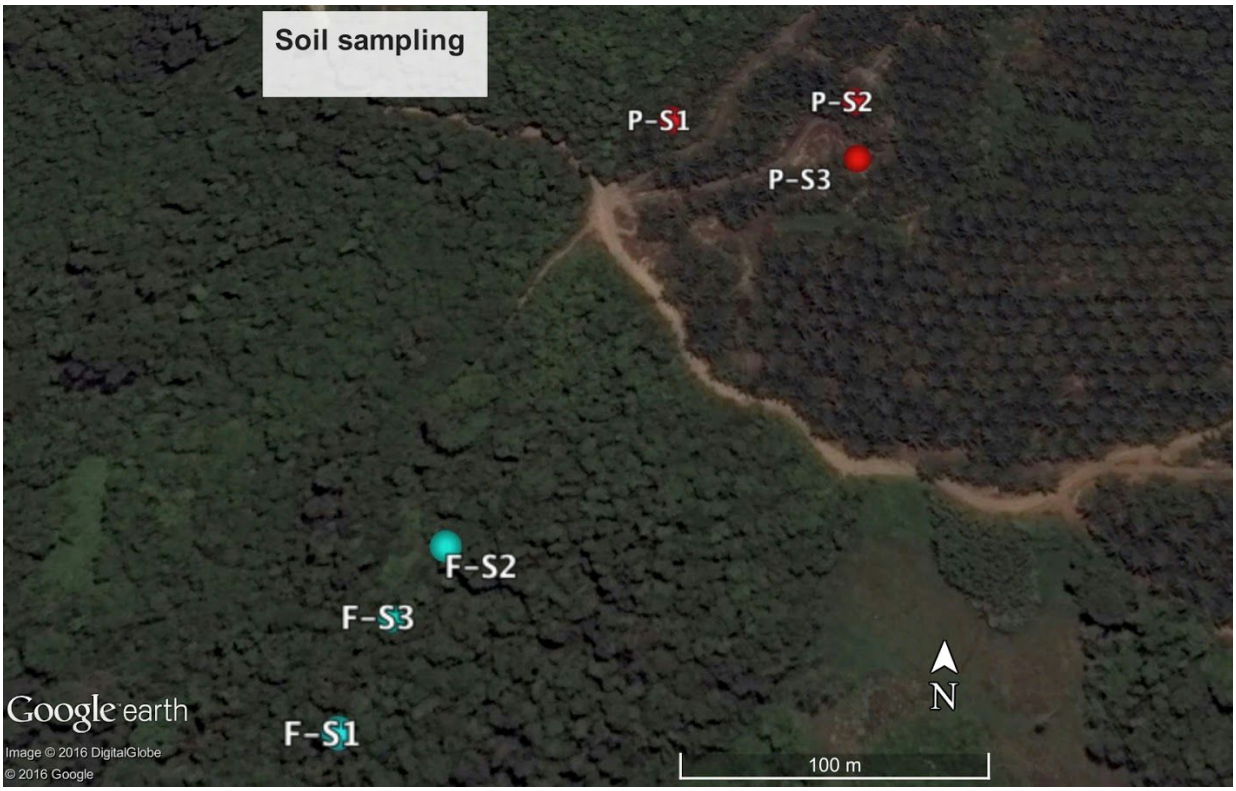
Here, it does not seem as if there is a scarcity in forest resources such as vegetables, but it appears that selling them was an important component in their income. Not only for the household's income but also for their own subsistence, as evidenced by Figure 2. Others seem to have it more as an addition to their livelihood, where another woman tells us that she will go once a week to collect the wild vegetables (IT1). For those who have the forest resources as a primary livelihood, it could potentially be problematic if the plantation expansion led to scarcity in forest resources, especially those who do not participate in the schemes and thus neither have the income from the dividend or surplus from the rubber scheme (SSI3, Q3 Notes).

If plant species used for food or medicine disappear in the conversion to oil palm, it could lead to a reduction in usage of the forest. This may become a push factor in the matter of seeking alternative livelihood strategies; buying instead of collecting, using western medication instead of traditional or seek plantation collaboration or urban employment. This push factor is contributing to and facilitating both migration and expansion of plantations. Forest dwellers and swiddens will most likely fade too. In this perspective the villagers are not just passive actors

affected by top-down change, but in their active adaption actually giving silent approval to these changes and thereby interdependently contributing to their intensification.

5.2 Soil fertility

As the above section show, the plantations appear to be continuingly expanding, which makes it all the more important to understand the environmental impacts of the plantation.



Map 3

The following results were obtained from the C/N analysis, pH and pox test (see appendix 2 for calculation):

Figure:

Sample average	Total Carbon %	Active Carbon	pH
Forest layer 1	0,290	633g/m^3	3,77
Forest layer 2	0,040	215g/m^3	4,30
Forest layer 1+2	0,110	424g/m^3	4,04
Oil palm layer	0,043	159g/m^3	4,43

From the samples a statistical evaluation of the results was conducted (see appendix 2). This was done to check whether the difference in total carbon, active carbon and pH in the forest samples were significantly different from the ones in the oil palm plantation. In relation to total carbon and the active soil organic carbon, they were both significantly higher in the topsoil of the forest compared to the soil in the oil palm plantation. There doesn't seem to be any larger difference in the fertility in the deeper soil layer in the forest and the oil palm layer. Regarding pH all the soil samples were acid, but pH was generally lower in the topsoil of the forest compared to the oil palm layer. The low pH might be caused by high levels of organic matter, which beneficial effects are high (Bill, 1999), and have to be taken into consideration when looking at the pH.

Regarding soil sampling, certain biases, both during sampling and analysis in laboratory, may have affected the results. For instance it was not possible to take the soil sample in the same manner at every plot. Layer 1 in the second forest sample was only 1 cm whereas it was 10 and 5 cm in the other forest plots. The second forest sample had to be taken from the top down rather than from the side, to avoid mixing horizons. This can have caused the high concentration of active organic carbon in this sample. The high level of active organic carbon in this sample was also causing trouble with the pox test. The concentration of the permanganate reagent was too low for the second forest sample, since it was all consumed during the oxidization of the carbon, making it impossible to get a reading. A minimum value was therefore calculated by using the concentration for when all of the permanganate reagent is converted. The result from this particular sample may be underestimated as a consequence.

With the introduction of SALCRA in Linsat and the following conversion from forest to oil palm plantation a decrease in soil fertility may have occurred, in terms of the carbon content, assuming that the soil in the oil palm plantation previously was similar to the soil found in the secondary forest.

The negative effect that the oil palm plantation can have on the soil is also expressed in the gender separated crop ranking. Both men and women, unequivocally, stated that oil palm had the worst impact on soil, noting that once oil palm had been planted, the only thing that could be planted if it was cleared, would be more oil palm (CR). Oil palm however, according to the men, had the feature that it could grow almost anywhere and is not dependent on how fertile the soil is(CR).The indication that the plantations have negative effect on the soil especially proves important as the plantation is only leased and the villagers thus have the possibility of having the land returned when the time period of the scheme runs out. One can however raise the question what options they at that time would have for re-cultivation of other crops if the soil is degraded.

5.3 Biodiversity loss and hunting practices

As a natural result of the plantation expansion and deforestation, biodiversity and wildlife appears to have been affected as well. On the forest walk, Rentap mentioned that “Once, when all this was forest there were also many monkeys” (SSI4).

Initially, we were informed that none of the villagers hunted anymore (VP). That this was not the fact, we only found out when directly asking in some of the latest questionnaire interviews. When directly asked, three household told us that they hunted wild boar, snakes & squirrels, and one additional household collected snails (Q Data). However some responded that only the people from Junggku Mawang hunts (SSI3; IT1), and others just told stories of relatives or others who hunted (SSI3) In an SSI we were told that “Many or most villagers do it [i.e. hunt]”, when asked how many in the village was hunting (SSI7).

An explanation for the secrecy about the hunting practice may be that the homemade guns are illegal and razzias are conducted occasionally: “We have to hide the homemade guns because it is not legal and the police sometimes come undercover [...] to search the houses.” (SSI7).

It seems that the villagers mostly hunt larger animals in “the forest far away” [on the border to Antayan], and “In SALCRA and RISDA area there is only small animals” (SSI3). Regarding the frequency of the hunting activities Antan and her husband says that hunting is seasonal (SSI3). Rentap during an informal talk, tells that:

> “Squirrels we hunt every day in the SALCRA plantation. We go in the afternoon when they get out of the forest to eat the palm oil fruits in the plantation borders. We make a hiding place of palm leafs and wait for them to show. Then we shoot them with homemade guns [with glass marbles] and cook them afterwards” (SSI4).

Regarding what animals are hunted, Antan & her husband tell us that it is “snakes, squirrels, iguanas, armadillos, pangolins, fox & flying fox bats” (SSI3). Rentap explains that “we hunt when we see them. But the deer we don’t see anymore, and the wild boar, snakes and many other animals are becoming rare and disappearing” (SSI4).

Several villagers inform us that wildlife has decreased significantly (FW; SSI2). The plantations and loss of large trees was seen as part of the reason (FW). This is supported in SSI2 where the husband explains that: “it [i.e. wild boar] started to disappear when SALCRA started” (SSI2). When asked of his opinion about the decline in wild boar stocks, Rentap answered; “It is sad, we cannot find the meat anymore” Furthermore he explains that “it is expensive to buy, now it is 16RM / kg for pig” (SSI2) - here, the main concern about the decline in biodiversity seem to be for their economy and access to free meat.

6. Socio-economic impacts of SALCRA

In order to investigate the socio-economic impact of the schemes from the villagers' point of view, we asked about the villagers' opinions and expectations to SALCRA and to what extent these expectations had been met. The triangulation of data from the questionnaire, SSI's and informal interview combining qualitative and quantitative data, enabled us to capture the complexity of the villagers' perceptions on the schemes.

6.1 Perceptions and expectations to SALCRA

Predominantly, the villagers seemed to believe that engaging with SALCRA would result in economic benefits (Q data, SSI2, 5). One of the major issues with Salcra stems from the fact that the dividend has not been as expected or paid in due time: "[…] Now it has been 8 years and some finally got their dividend. But it turned out that it was insanely low" (SSI5).

The dissatisfaction with the dividend had reached a point where all the villagers, except the headman, had gone to the SALCRA office three times to protest this (SSI5). According to Biku, the response from SALCRA has been that "we [villagers of Linsat] do not work well enough or manage our land properly" (SSI5). She does not completely disagree, saying that the monitor is not sending in the required reports (SSI5), but considering that most of the villagers lease their land, without being employed in the plantation, this appears to be an arbitrary accusation (Q data). The local mismanagement was also mentioned by another informant complaining about block 6 not being maintained well. This we also noticed during our plantation tour, where we saw, as evidenced by the picture below, that some of the oil palm plantation was covered with weed and grass (PT, SM).

SALCRA had, as mentioned earlier, estimated that the dividend would be ready around 2013-2014, but there seems to have been a miscommunication about the size of this dividend. The problem seems to be that the fruit from the oil palm is still not big enough to generate a significant surplus once this is the case, the feeling towards SALCRA could change.

In a broader sense, this conflict may tell us something about the villagers' perception of SALCRA, and their sense of being excluded from the decision-making-process. This may add to the frustration towards SALCRA as experienced by some in the village.

On a more positive note, one of the informants notes that SALCRA's promise of "a better life" had been put into practise as they had build a road (SSI5). As mentioned, SALCRA have established dirt roads that connects Linsat with Sepan through the plantation, which have been met with positive attitudes by the villagers, as it eases the transport in the daily life for both farmers and those using the forest (SSI2, SSI3, SSI5).

A key component of SALCRA's promise of a better life is the promise of land title after 25 years, which has been an influential factor in the decision to engage with SALCRA (Q data, SSI5, VP). As stated by one respondent: "If you don't have land title it is easy for any company to do anything with your land" (Q data). As the quote indicates, the legal land title is a means of achieving livelihood security by gaining complete rights to your land. Theoretically speaking, livelihood security is an important feature for any livelihood, as it is often the pursued outcome of any livelihood strategy. Livelihood strategies, which is the combination of the activities and choices individuals or households make to achieve livelihood goals such as increased security, will be shaped by various internal and external structures and processes (DFID, 1999).

The trouble with the dividend has for one informant also created mistrust to SALCRA regarding the land title:"Now I am not sure if the same will happen with the land title like what happened with the dividend. Long waiting and not being sure what you get" (SSI5). We do not know if this opinion reflects a general point of view but it paints a picture of villagers losing confidence in SALCRA. Only four of the 19 respondents in the questionnaire, who are not collaborating with SALCRA, would like to if they could choose again now. Of the remaining 15, 7 said that they would either not join because it is not profitable (5), or because of the delayed or small dividend (2).

The fact that villagers engaging with SALCRA do not have control on what is happening on the plantation and do not get a noteworthy outcome out of it, is directly and indirectly criticised by especially RISDA participants who highlights this fact as the main difference between RISDA and SALCRA. An informant, when asked about what scheme he would chose today says 'RISDA'; "It is better when you decide for yourself when to harvest" (Q2 notes). Another informant confirms the importance of autonomy and says that "With SALCRA it is not 100% yours. You will only get the benefits if you have huge land" (SSI6).

RISDA, on the other hand, is not considered as leasing, "because they only do the cleaning and the planting, after that we harvest it ourselves and feel it is our land" (SSI2). This indicated that the landowners' attachment to land is absent as long as SALCRA is "borrowing" the land because SALCRA, and not the landowner, are in charge of the production and the outcome. With RISDA on the contrary, as soon as all the hard and initial work is done, the owner gets full access to the land, the production and the outcome, why they still see themselves as the de

facto owners. This sense of ownership and attachment to land has proven to be important for the villagers, and have influenced whether they engaged with SALCRA or not. Leasing their land to SALCRA will also have physical consequences, and remove future economic opportunities. As stated in the crop ranking, once oil palm has been planted, you can only plant more oil palm, not other crops (CR). Two villagers in addition expressed dissatisfaction with the lack of job opportunities in the scheme, as SALCRA mainly hire Indonesian workers (Q data).

According to our data the attitude towards RISDA is in general positive and many prefer RISDA over SALCRA because they say it is more beneficial and because “RISDA does not promise anything, they just help” (SSI2). SALCRA has promised the villagers big things as “a better life” but the ones engaging in the scheme have either not gotten their dividend as promised, or it is less than expected. As a result the image of SALCRA has not become one of “helping” but instead one of “borrowing” the land. Any comparisons between two, however, will be influenced by the differences in stages that the schemes are in.

In sum, it appears that many of the socioeconomic benefits which was expected from SALCRA, has not yet been effectuated. As there appears to be a feeling of insecurity as of whether these expectations of economy and tenure will be met, the villagers appear to see benefits having influence in their land themselves, which seems to inform the decision of joining RISDA.

7. The notion of sustainable development

This section will discuss the findings from the previous sections in relation to the concept of sustainable development. Additionally, texts from SALCRA’s homepage will be included to discuss how respectively SALCRA and the villagers present and articulate development and how the social, economic and environmental components of sustainability are weighed.

Sustainable development can be seen as a hybrid of both social, economic and environmental goals, and the prioritization of these different components may have significant effect on both the meaning of the term and outcome of development projects (Willis 2009:372). The broad understanding and use of the term sustainable development opens up for flexibility but also associated pitfalls. Since there are endless ways of interpretation, the concept can legitimize a range of very different political projects and interests - whether they are environmentally sustainable or not (Willis 2011:179). Like W.M. Adams puts it: ‘’development and sustainability are ‘’buzzwords’, unavoidable, powerful and floating free” (Adams 2009:2). The fact that such buzzwords have become somewhat universal and integrated in ‘global’ development discourse has however, according to Cornwall, masked their origins (2007:473).

The classic (western) and some would say most widespread definition of sustainable development is found in the Brundtland report from 1987 (WCED), namely that sustainable

development is development that ‘’meets the needs of the present without compromising the ability of the future generations to meet their own needs’’ (WCED 1987 chapter 1.3). An often dominating rationale interpreted from the report is that we need to treat natural resources more carefully, since unsustainable use will lead to limited possibilities for continued economic growth (WCED 1987 chapter 3; Willis 2011:178). In such rationales, where economic growth becomes the goal, and prevention of unsustainable use of resources becomes a means to this goal, the economic and social component can be said to dominate the articulated incentive for environmental action.

7.1 The villagers' articulation of development

We chose not to ask the villagers directly about sustainable development. We wanted to avoid manipulating them to use the term as it would intensify the bias. Instead we asked more broadly about changes in the village and the surroundings. In their response to such questions, many of the villagers put emphasis on the physical improvements and facilities that made their livelihood strategies easier to pursue. E.g. in SSI1 we asked about the wife's thoughts on the plantation expansions to which she replied ‘’today it is much better in terms of roads, infrastructure, water. SALCRA and RISDA is much better for the village now’’ (SSI1). This is one of the examples of how infrastructure and other village facilities surface as important themes or indicators of development. Such changes are framed like improvements with connotations of an *easier life* as in comparison to a more complicated past:

> *‘’last time we didn't have access to the SALCRA plantation area but now we have access road. Before, we had to go through swamp area or jungle. And now it's easier to go to Antayan. Now we can go fish with car or motorbike. Before it was hard, it took the whole day to go fishing or go to the forest. Now it only takes 30-40 min.’’ (SSI3).*

In contrast to the questionnaires, where it seemed difficult for the villagers to follow our division of now and ten years ago, there was throughout the SSIs a strong articulation of the difference between ‘’last time" or "before’’ versus ‘’now’’. In the above quote it is again evident how the presence as compared to the past is associated with improvements that makes life easier; distances seem shorter and certain activities become less time consuming. Many of the informants have talked about such developments indirectly, though the specific term ‘’development’’ is difficult for most to elaborate. The female respondent talked about improvements in terms of roads and electricity, but when she was asked how she understood development, her intuitive response was ‘’the scheme’’ (SSI 2)'. When she had difficulty to explain why, the husband later explained: "It is different things, there is the development in the village e.g. the road, and then there is SALCRA’’ (SSI 2). It here seemed like the specific term 'development' was associated with the scheme but that the development in practise was associated with physical village improvements. In this sense, her answers were a bit

contradictory and ambiguous, as she afterwards mentioned that the village development like roads was not the same as SALCRA development which was referred to as plantations.

The villagers' articulation of development varied but a common feature was that no one put particular emphasis on nature or environmental impacts. Sometimes, when asked about land use changes, forest or jungle was mentioned in relation to the past, where the physical improvements in the village were described in relation to the present. As pointed out in section 3.2.1 and 3.2.2, a relatively pragmatic attitude towards nature and environment seemed prevalent, and this was echoed in the villagers' perception of development: Changes in the environment are considered good if they go hand in hand with improved facilities associated with increased efficiency that can lead to an easier life, and several villagers are positive towards 'development' even though it is at the expense of the natural environment (SSI3, 4, 5, 6). As one woman stated: ''We like to see the development in the land, even though there is no forest'' and ''development is that it is easier to go to town'' (SSI 2). Here she briefly mentions a past of forest (or jungle) but in the same flow of speech she directs the focus to the physical improvements associated with an easier life - it almost seems like these improvements have replaced benefits of the forest resources, but that it has been a reasonable tradeoff. We cannot conclude that everyone feels this way, but nor do we have any examples of the opposite. Improvement of livelihood, social and economic growth is found of dominating value in the villagers perception of development. They have a pragmatic outlook and seek an easier life and economic benefits etc.

With regards to the socio-economic dimension of development, a recurring narrative among the villagers was the coupling of city life with 'modernity'. The majority of the villagers interviewed seems to see city employment- and settlement as a more modern way of living, and expressed proudness of children studying or working in the city. This does however not mean that it is straightforwardly what they prefer, as some things are still considered easier and safer in the village than in the city. Two women, having lived 10 years outside the village, considered village life more stable as they could live here permanently, did not have to pay rent besides for water and electricity, and could easily find food (SSI3, Q3 Notes). In this context it appears that village life represents some kind of safety and familiarity but also with major limits. The city on the other hand may represents more opportunities but also unfamiliarity and insecurities as it requires money to feel secure in the city – in the village, on the contrary, they can get food easier as they can harvest or hunt it instead of buying it for money they don't necessarily have. Furthermore they have more control of their future and are less vulnerable in terms of having to migrate for jobs. It seems like they adapt to and welcomes development in terms of improvements, but that modern strategies of moving to the city is a kind of development they either do not want to pursue, or cannot afford, as some modernization waves takes capital to follow.

7.2 Articulation of sustainable development on SALCRA's homepage

On SALCRA's homepage it is articulated how their projects help with both environmental, social, and economic development. When you go to their homepage and click on the heading ''Sustainability'' it will direct you to a page with following statement:

> SALCRA, as one of the state land development agencies that is helping to improve the social and economic well being and transformation of the rural people where it operates, is committed to sustainability and social responsibility in its mode of operations. It believes that there is no alternative to sustainable development and will work closely with its participants and stakeholders in pursuit in this objective (SALCRA 2016e)''

Besides the strong cultural modernist connotations in wordings such as "transforming the rural people", it is interesting how sustainable development is presented in a linguistic mix of objectives that, in discourse, seems to relate sustainable development closely to economic and social development - the environment is not mentioned nor is sustainability defined. In a subheading to 'sustainability' it is described how to carry out what SALCRA calls E&S activities (environment and sustainability). Three aspects are listed with the wording that they are "given prior importance":

1. Social aspects
2. Safety and health
3. Good agricultural practices

It is noteworthy that the social and agricultural practices are given prior importance within the category E&S. When environmental sustainability is mentioned, is is primarily with regards to specific techniques (such as planting techniques and pest and disease control), rather than as an overall strategy and reflection on the impacts of large scale plantations. This priority relates to SALCRA's main objective, which according to their website is:

> "to raise the long term productivity and optimum utilization of Native Customary Rights (NCR) land by developing and managing the development of such land which are hitherto under-utilized, unutilized or underdeveloped into socially and economically viable plantation" (SALCRA 2016f).

In this quote, a dichotomy is constructed between under-utilized, unutilized or underdeveloped land as contrary to socially and economic viable plantation. At the same time the term underdevelopment is put in the same category as land that is not (sufficiently) utilized, while plantation is put in the same category as the social and economic viability. The wording again implies that development is seen as something that has to do with socio-economic growth and optimization which plantations are believed to contribute to.

The overall impression from SALCRAs section on sustainable development is that the term ‘’sustainability’’ and ‘’sustainable development’’ is widely used to describe and encompass a broad range of themes, as when they briefly mention that they will “[c]oordinate activities based on the concept of 3Ps – Planet, People and Profit” (SALCRA 2016e). The so-called 3P’s characteristically shows how broadly the term is actually used - both on micro and macro level. When the terms are used so broad and vaguely, where it appears that everything can be framed in the name of sustainable development, the concept seems more like a legitimizing discourse and linguistic rather than a specific goal in itself or an overall value for the scheme (Cornwall 2007: 474). SALCRA in a sense indirectly seem to value modernity over sustainability - but they justify this valuation by the buzzwords of sustainable development.

In a critical perspective, SALCRA can be seen as an example of a so-called development scheme which paradoxically places itself within the narrative of environmental solutions while at the same time, according to our findings, causing problems for soil fertility and biodiversity through oil palm cultivation. This paradox in SALCRA’s objective and practice can further be associated with a common dilemma in mainstream development thinking (urbanization, economic growth, industrialization etc.), namely that the environment seems to be negatively affected by the kind of development that is prioritized in a modernist approach to sustainable development (Adams 2009:343). We can here raise the questions; if such development is leading to environmental problems how can it at the same be seen as a solution to these problems?

According to Adams (2009), it has been a widely acknowledged strategy to perceive modernisation as a means to sustainable development. But with this take on modernity, it can be argued that the discourse of sustainable development comes to mimic some the characteristics in the classic linear and incremental take on modernization, which was dominant in the post WWII era (Burnell, Randall & Rakner 2011 :19; Willis 2009:366-67). This approach, where distribution of knowledge and technology was seen as a means to agricultural and industrial progression, has however been criticised for leading to a ‘’one size fits all’’ politic that doesn’t recognize the specific country’s (or community’s) environmental, social, and cultural context (Willis 2009:366-67). The narrative of SALCRA at least has the potential to intensify the notion that there is one right way of development, and that there is a certain level of- or a continuously striving towards industrialization and modernization that the country and its communities must reach in order to consider themselves, and being acknowledged as, ‘’developed’’ instead of ‘’developing’’, or even “undeveloped”. This is seen in the above expression of “developing the rural people” or phrasings as “It takes many decades of changing the mindset of the rural communities to accept change’’, where the rhetoric on SALCRA’s homepage in some ways construct a patron-client relationship to the villagers, and connotates cultural modernist approach, as represented by modernists such as Lerner (1958).

7.3 Ambiguous understandings of development

Summing up, there appears to be a primary focus on improvement of livelihood and economic growth among the villagers, which bears similarity to SALCRA's development rhetoric of economic modernization. Even though we cannot generalize nor homogenize neither the villagers or SALCRA, this approach bears similarities with the take on sustainable development commonly derived from the Brundtland report, where social and economic sustainability was weighed more than the environmental in itself (1987).

The villagers speaks of development, modernisation and improvements in similar rhetorics as SALCRA, only without the extensive use of buzzwords, and they often refer to 'what used to be', as a way of highlighting that they have 'moved forward'. In this, their approach almost seem to echo the modernist perception of a linear and incremental development from 'underdeveloped' to 'developed'. However, as explained in our methodological reflections, the villagers perception on time did not in other aspects appear to be linear in this sense. While we do not want want to assume a causal link between SALCRA and the villagers, as many internal and external factors and public discourses may influence their perceptions, the at times ambiguous perceptions of 'development' represented by the villagers, could point towards them having adopted not only a language but also a certain perception on 'what ought to be'. As such "[D]development is much more than just a socio-economic endeavour; it is a perception which models reality, a myth which comforts societies, and a fantasy which unleashes passions' (Sachs 1992 in Cornwall 2007, 471). As SALCRA, at least in discourse, appears to construct a patron client relationship to the villagers. But in the light of the findings and reflections in this analysis, the villagers can be seen as not just passive actors affected by top-down change, but in their active adaption actually giving silent approval to these changes and thereby interdependently contributing to their intensification;there hasn't been any actual protest against the land changes or forest clearance. The only real protest has been related to dividend.

A main distinction in the villagers' and SALCRA's approach to development can be said to be, that the discourse of the villagers mainly seem to refer to an economic and facility-oriented take on modernity - whereas SALCRA, at least on their homepage, additionally articulate a cultural understanding of modernity, where also the people have to undergo a certain transformation from 'underdeveloped' to 'developed'. For the villagers, on the other hand, this social aspect of modernity seems less absolute and linear; while they do in some ways value certain modern features and choices such as living in the city, they also value 'traditional' practices and beliefs which are associated with both proudness and security.

8. CONCLUSION

This case study has revealed an ambiguous and complex relationship between the villagers and SALCRA with regard to understandings of development. On the one hand the scheme appeared to have several negative impacts on the environment, and the socioeconomic benefits in terms of income from the dividend and land title had not yet been seen, which was associated with a range of worries. On the other hand, the villagers in many ways seemed to have positive connotations towards the development associated with SALCRA. However, with SALCRA's patron-client approach to development, the villagers become objects of change instead of subjects with ownership in the development project. At the same time it was evident that they were not passive actors, as their different livelihood strategies were also a result of active choice. Their attitude towards the nature and environment is of a pragmatic nature, and there is no evident protest related to the forest clearance.

Our findings are in different ways a contemporary and context specific example of tradeoffs between the different components of sustainable development, namely socio-economic and environmental objectives. In this case, the environment seemed to be subordinated to more socio-economic objectives. Such tradeoffs can also be seen on a global scale, where it is continually apparent that the components of sustainable development are not necessarily mutually supportive; In our case, the modernization that is prioritized seem to work against the environmental objectives.

On a more personal note, our findings must be understood in the light of our preconceived prioritizations; we entered and left the field with an academic, normative, and relatively ecocentric point of view. Considering our different lifeworlds, this naturally differs a lot from that of the people involved in our study who are dealing with real life problems and related priorities. This can seem obvious, but it is an important reflection to our conclusions.

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List of appendices

	Main Authors	**Contributing Authors**
Abstract	Katja	Louise
0. Acknowledgements	Jeppe	Erika
1. Introduction	Ida, Louise	All
1.4 Clarification of Key Concepts	Ida, Louise	Katja
3. Methodology	Ida, Louise	All
3.1 Analytical framework	Louise, Ida	All
3.2 Perceptions, expectations ...	Louise, Ida	All
3.3 Interdisciplinarity	Louise, Ida	All
3.4 Description of key methods	Louise	Katja, Ida
Analysis	All	All
4.1 Development schemes in Linsat	Katja, Ida, Erika	All
4.2 Land use changes	Erika	All
5. Environmental impacts	All	All
5.1 Plantation expansion and empty land	Ida, Louise	Katja
5.2 Soil Fertility	Jeppe, Katja	Louise
5.3 Use of forest resources	Jeppe	All
5.4 Biodiversity loss and hunting practices	All	All
6. Socio economic impacts of Salcra	All	All
6.1 Perceptions and expectations to the scheme	Katja, Erika	Ida
6.2 Attachment to land	Katja	All

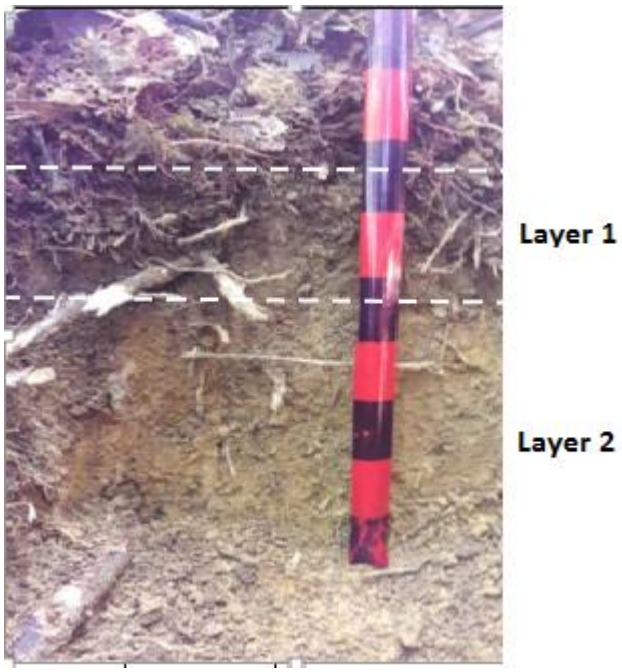
7. The notion of sustainable development	Louise, Ida	All
7.1 The villagers articulation of development	Louise, Ida	All
7.2 Discourses of sustainable development on Salcras homepage	Louise, Ida	All
Sustainable development	Louise, Ida	All
Conclusion	Louise, Ida	All

List of appendices

Appendix 2 - Data from soil analysis

Colour:

The colour of the soil has no direct impact on the function of the soil, but it is one of the most useful indicators of soil quality and can be used to relate physical and chemical properties. For instance is dark soil an indication of organic matter (Botkin & Keller, 2012). Knowing that there is a connection between the colour and soil properties, the soil samples at a plot were taken based on differences in colour. The purpose by doing this was to capture the variations within a plot. The different layers in the soil, based on colour, can be seen at the images below. Only images from the first forest and oil palm sample are included here since the other plots were similar in appearance.The main difference between the forest and oil palm samples were the dark layer which suggest that there is more organic matter in the forest samples. We assessed the soil organic matter by measuring soil organic carbon.



Forest sample 1

Oil palm sample 1

The soil organic matter is one of the most acknowledged indicators of soil fertility because of its many important properties. Soil organic matter does however vary in chemical composition and therefore soil organic carbon is usually measured, since it is one of the main components. Changes in soil management and land use can also lead to changes in soil organic carbon. These changes in carbon can be small, but they can have a significant effect on the soil properties. It has therefore been decided to measure total carbon content (Weil et al, 2003)

pH:

pH affect the availability of certain ions in the soil. An alkaline soil with a pH above 8.5 often disperse while an acid soil with a pH below 5,5 increases the toxic level of aluminum and manganese. The microorganism activity in the soil is also lowered in an acid soil. Because of these issues related to a pH too high or low most crops prefer a soil with a pH of 6,5 (FAO, 2016). Due to the effect of pH on soil properties it has been included in the analysis.

Pox test

One of the issues by measuring the total amount of soil organic carbon is that it can take several years before you will be able to measure a difference. In order to make sure to be able to see any differences between the forest and the relative newly established oil palm plantation, a pox test have also been conducted. The soil organic carbon can be divided in a passive carbon pool, which is only mineralised slowly by microorganisms in the soil, while the active carbon pool is altered rapidly. A pox test can pick up changes in the soil fertility more quickly, because it only measures the active part of the carbon pool. The active carbon pool is an important energy source for microorganisms. Microorganisms affect the nutrient cycles and biologically soil properties greatly. For this reason it also makes sense to look at the active carbon pool separately rather than as part of the total carbon content (Weil et al, 2003).

First sample

Sample	Concentration a (M/L)	Active carbon (mg/kg)
Oil palm sample 2	0,018	144
Oil palm sample 3	0,017	216
Forest sample 1 layer 2	0,015	360
Forest sample 1 layer 1	0,003	1224

Second sample

Sample	Concentration a (M/L)	Active carbon (mg/kg)
Forest sample 3 layer 2	0,020	0
Oil palm sample 1	0,019	72
Forest sample 2 layer 2	0,016	288
Forest sample 2 layer 1	0 (Not readable)	1440
Forest sample 3 layer 1	0,005	1080

Bulk density

Sample	Density ($g/100cm^3$)
Forest Sample 3 Layer 1	56
Forest sample 1 layer 1	57,39
Forest sample 2 layer 1	41,22
Forest sample 3 layer 2	121,3
Forest sample 2 layer 2	104,3
Forest sample 1 layer 2	95,54
Oil palm sample 1	122,8
Oil palm sample 2	110,5

Oil palm sample 3	106,6

Statistical evaluation

From the samples a statistical evaluation of the results was conducted using a T-test. This was done to check whether the difference in total carbon, active carbon and pH in the forest samples were significantly different from the ones in the oil palm plantation. A significance level of 5% has been used to determine whether that is the case. If the p value is less than 5% the samples will be assumed to be significantly different.

α: 5%

Sample comparison (active carbon)	P value
Forest layer 1 + Oil palm layer	0,0009
Forest layer 2 + Oil palm layer	0,6565

Sample comparison (total carbon)	P value
Forest layer 1 + Oil palm layer	0,00486
Forest layer 2 + Oil palm layer	0,88610

Sample comparison (pH)	P value
Forest layer 1 + Oil palm layer	0,0104
Forest layer 2 + Oil palm layer	0,3264

Calculation of active carbon (example from oil palm sample 2)

The bleaching of the purple $KMnO_4$ (reduction in absorbance) is proportional to the amount of oxidizable C in the soil; the greater the colour loss, the lower the absorbance reading meaning the greater the amount of oxidizable C in the soil. To estimate the amount of oxidized C it is assumed that 1 mol MnO_4 is consumed (reduced from Mn^{7+} to Mn^{4+}) in the oxidation of 0.75 mol (9000 mg) of C.

MnoxC (mg/kg) = [0.02 mol/l – (a mol/l)] * (9000mg C/mol) * (0.02 l solution/0,0025 kg soil)

0.02 mol/l is the initial solution concentration
'a' is the concentration measured in the supernatant
9000 mg is mg C oxidized by 1 mol of MnO_4
0.02 l is the volume of $KMnO_4$ solution reacted

0.025 kg is the weight of the soil being used
->

[0.02 mol/l – (0.018 mol/l)] * (9000mg C/mol) * (0.02 l solution/0,0025 kg soil)= 144mg/kg

Using the bulk density to get the concentration in volume.
First getting the density in kg/m^3 rather than g/100cm^3 since it is easier to relate to.

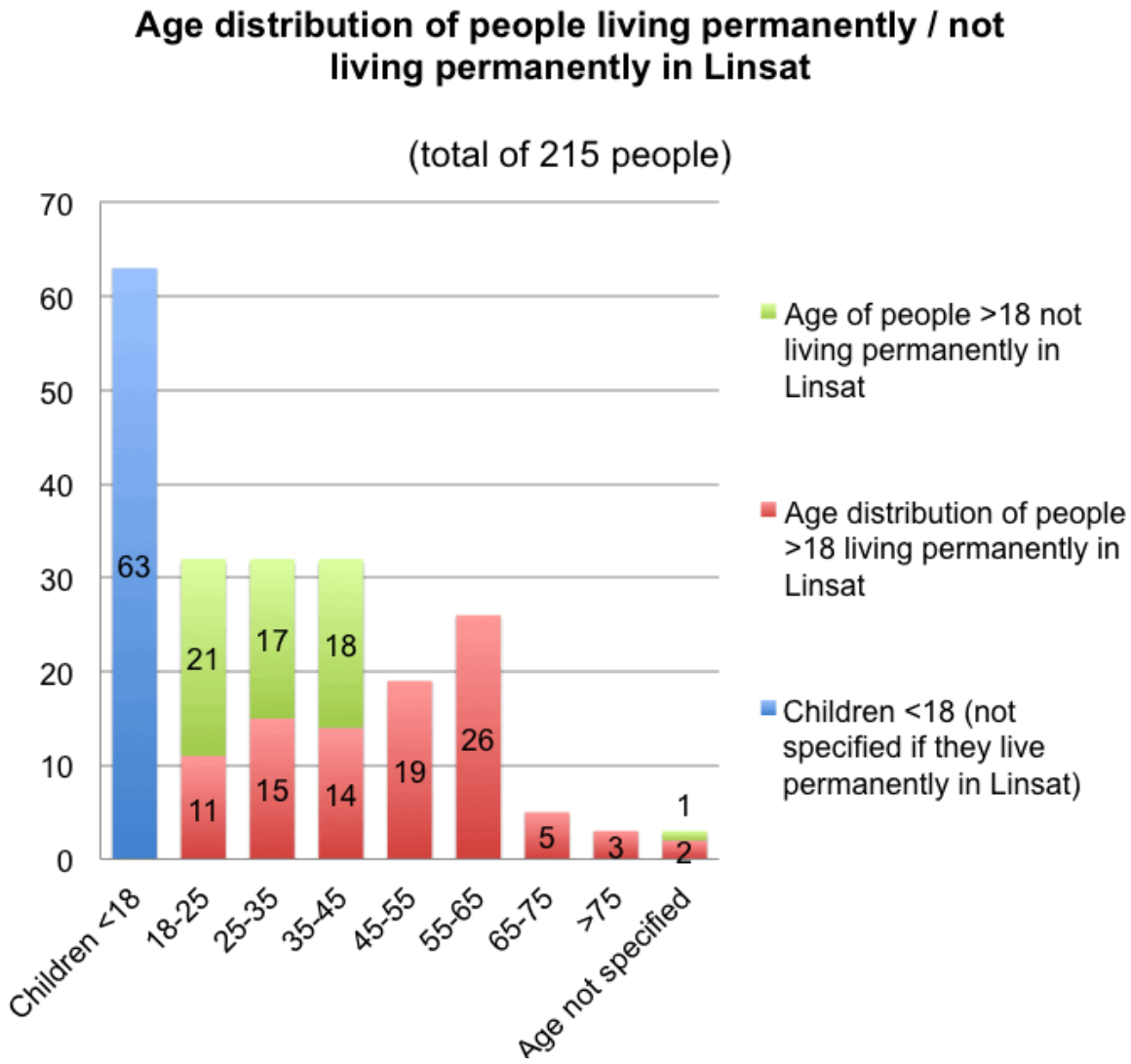
(110,55g/100cm^3*10^4)/1000=1105,5kg soil/m^3

Then calculating concentration of active carbon in g per m^3 using the result from the pox test.

(144mg/kg*1105,5 kg soil/m^3)/1000=159g/m^3

Appendix 3 - Village

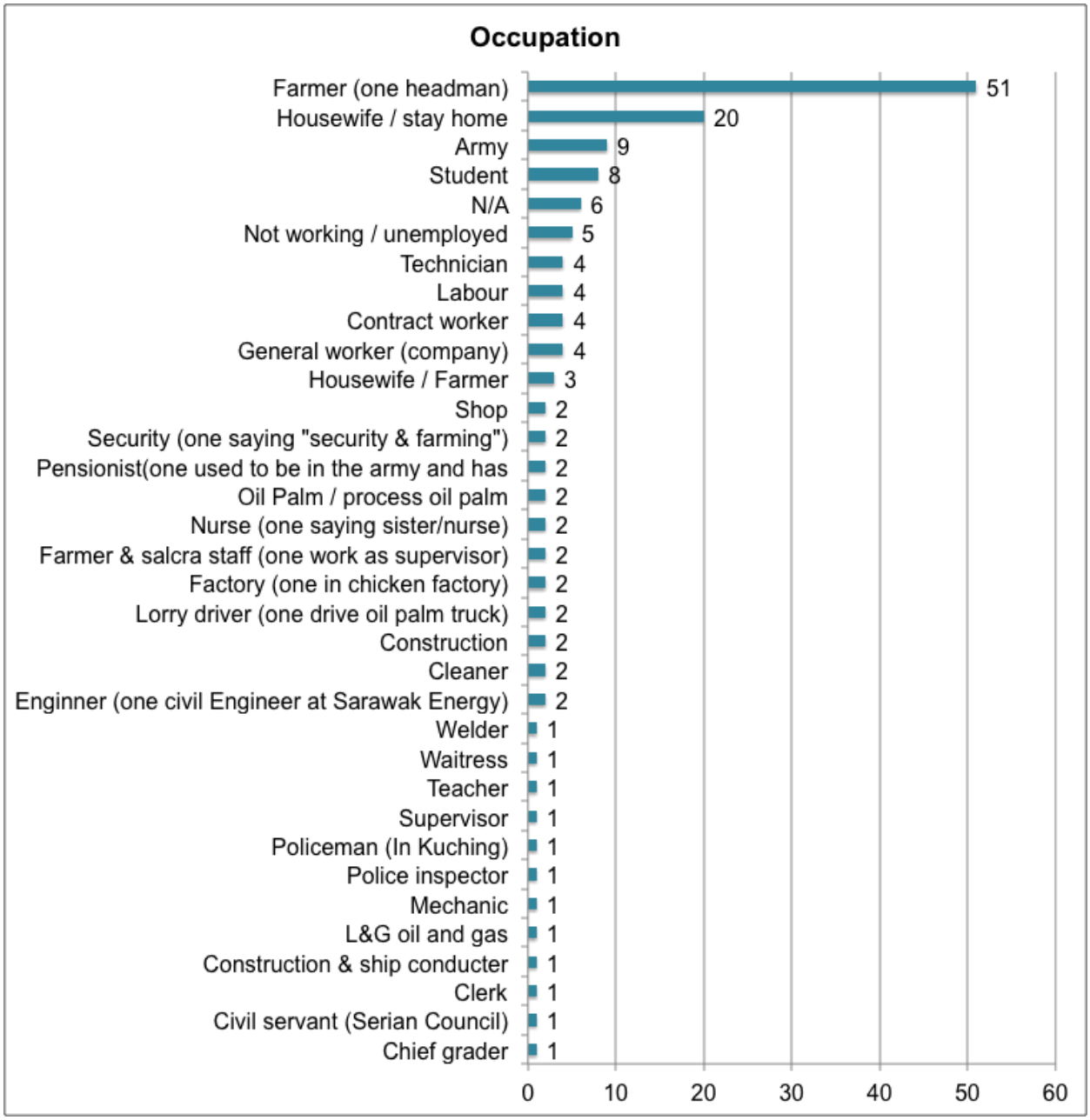
According to the headman it is mostly elders and kids who lives permanently in the village, as many younger people live in the cities, which is reflected in the below graph, showing the age distribution and residential status of people living in Linsat[1] (VP; Q Data). 95 individuals out of 215, equivalent to 44 pct., lives permanently in Linsat. The graph seems to indicate that even though there is quite an equal distribution of age among all villagers, there is a proportionately large group of people between the ages of 55-65, living permanently in the village and assumingly constituting the everyday workforce (Q Data).



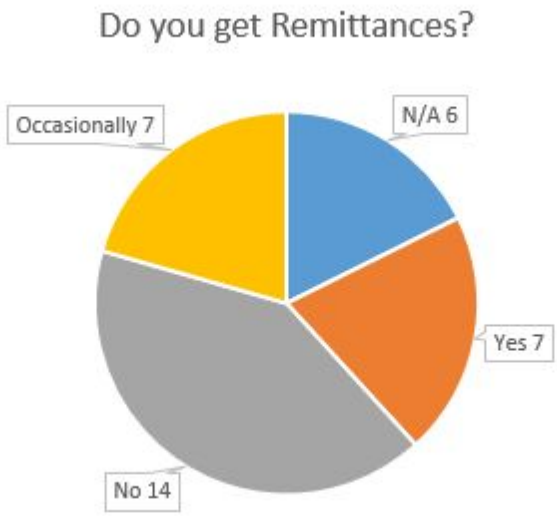
The most common occupation in our sample for people over 18 is farming, which with 57 individuals constitutes 37,5 pct of our sampling pool (including housewifes who said that they were farmers). There may, however, be a bias here as more of the housewives, and individuals with other occupations, could be involved in farming activities without mentioning

[1] Though it is important to bear in mind that the category of under 18 spans over 8 years more than the other categories

this as their primary occupation, which is what we asked about. 91,2 pct. of the farmers lives permanently in the village, with an average age of 48,6 ranging from 21-70 in age (Q data).



When asked about whether the household got any form of remittances, 14 households said that in one form or the other they did, as seen on Graph Y. 14 households said they didn't. This is part of a broader picture, that shows that households in Linsat are dependent on other income source than just the ones garnered from agricultural practices. This could include pensions (4 households), and state support in the form of brim, which was revealed by 7 households when asked about other income sources (Q data). However, it wasn't until we were made aware of the existence of Brim that we actively started to ask them about Brim, so some households may have omitted this from their answers, because they weren't aware that it classified as 'other' income source, or they simply forgot.


Do you get Remittances?
Occasionally 7
N/A 6
Yes 7
No 14

Appendix 4

Questionnaire for villagers in Linsat Batu Kudi

Date:
Household number:
Gender of respondent: ☐ F ☐ M

This questionnaire is made by the students from Denmark and University Malaysia Sarawak, who study sustainable land use. The purpose with the questionnaire is to get an insight in your everyday life considering agricultural practices. If you do not want to answer on a question, you are welcome to let us know. But your answers will only be read by the group staying in Linsat and the results are only used for the university report and will be anonymous. Do you have any questions before we start?

1. DEMOGRAPHY / HOUSEHOLD

We will go through questions about your household's garden activities, other agriculture activities and other income sources. Finally we would like to hear a bit about your engagement in development schemes. But first, in order to get some general information about people in the village, we would like to ask you some questions about your household

1.1. How many years have you lived in Linsat (Merbau) _____

1.2 What is your ethnicity? _____

1.3 Number of people over 18 years in your household: _____

1.4 Number of children in your household: _____

(question 1.5 on next page)

1.5 Now we would like to have some details about each member over 18 years:

1.5.1 Relation to respondent	**1.5.2 Gender** ***(write code)*** 1. male 2. female	**1.5.3 Age** ***(mark "e" for estimation)***	**1.5.4 Does the person live in the household?** ***(write code)*** 1. Yes, permanently 2. Yes, in the weekend 3. Yes, seasonally 4. No, do not live in household	**1.5.5 Level of education** ***(write code)*** 1. no formal education 2. primary education, 3. secondary education, 4. Diploma, university	**1.5.6 Primary occupation** (e.g. student, farmer, etc.)
Respondent					

2. SUBSISTENCE ECONOMY AND FARMING ACTIVITIES ON HOUSEHOLD GROUND

2.1 Does your household use any forest resources or used to? **(*e.g. hunting, timber, bamboo shoot)***

☐ Yes ☐ No ***(If no, go to question 2.2)***

If yes:

2.1.1 Now we would like to know a little bit about the different resources you collects or hunt or used to ***(e.g. wild vegetables, deers etc.)***:

a) What kind?	b) How often? 1. often 2. occasionally 3. used to ***(mark the number)***	c) For subsistence use ***(mark x for yes)***	d) For selling ***(mark x for yes)***	e) For exchange inside community ***(not for money - mark x for yes)***

2.2 Does your household have livestock?

☐ YES ☐ NO

If yes:

2.2.1

a) What kind? ***(e.g. fish-dam etc.)***	b) For subsistence use ***(mark x for yes)***	c) For selling ***(mark x for yes)***	d) For exchange inside community ***(not for money - mark x for yes)***	e) If you sell, how much (in RM) do you sell for pr. harvest?***(e for estimation)***	f) How often does your household harvest xx?

2.3 Does your household have a backyard? ☐ YES ☐ NO

If yes:

2.3.1 Please tell us about the crops that are planted in the backyard:

a) What kind of crop?	b) For subsistence use ***(mark x for yes)***	c) For selling ***(mark x for yes)***	d) For exchange inside community ***(not for money - mark x for yes)***	e) If you sell, how much (in RM) do you sell for pr. harvest? ***(e for estimation)***	f) How often does your household harvest xx?

3. PLANTATION CROPS AND PROPERTY

3.1 Does your household have any land?

☐ YES ☐ NO ☐ Does not want to answer

If no, go to question 4

If yes:

3.7 Is some of your land registered with Land and Survey Department?

☐ YES ☐ NO ☐ In progress

☐ Does not want to answer/ Does not know

If yes:

3.7.1 Is it in collaboration with:

☐ SALCRA ☐ RISDA ☐ None

Other_____

3.7.2 Have your household received official legal land title?

☐ YES ☐ NO ☐ In progress ☐ Does not want to answer/ Does not know

3.8 Do you lease your land to someone:

☐ YES ☐ NO ☐ Does not want to answer/ Does not know

3.2 How did your household get the land?

☐ Inherited ☐ Bought ☐ Borrowed: From who? _____

☐ Does not want to answer/ Do not know

Other:_____

3.4 We would like to know some details about the crops:

3.4.1 Type of crop ***(for rubber or oil palm mark R for RISDA or S for SALCRA)***	3.4.2 Size in hectares ***(or acres, points or number of trees)***	3.4.3 For how long has the field been cultivated with the specified crop? ***(in years)***	3.4.4 If you sell, how much (in RM) do you sell for pr. harvest?	3.4.5 How often does your household harvest xx?	3.4.6 What was the area used for before the current cash crop was planted? ***(e.g. fallow land, forest, other crops or do not remember etc.)***

3.5 Now we have heard about the crops you have in your farm now. Please try to remember when you were x years old, which types of crops you cultivated for selling or for self consumption***(10 years ago*)**

3.5.1 Type of crop	3.5.2 Size ***(hectares, acres or number of trees)***	3.5.3 For subsistence use ***(mark x for yes)***	3.5.4 For selling ***(mark x for yes)***

3.6 Does your household have fallow or forest land[1]? ☐ YES ☐ NO

If yes:

3.6.1 How many hectares/ acres: _____

3.6.2 For how long has it been fallow? _____

4. OTHER INCOME SOURCES

Do you or someone in your household earn money on the following activities:

4.1 Work in the city: ☐ YES ☐ NO ☐ Occasionally ☐ Used to

4.2 Remittances from outside the household: ☐ YES ☐ NO ☐ Occasionally ☐ Used to

4.3. Pension: ☐ YES ☐ NO ☐ Occasionally ☐ Used to

4.4 Other: _____ ☐ YES ☐ Occasionally ☐ Used to

4.5 ***(skip this question if none of these activities are being practiced)***

How much does the household earn on this/ these activities pr. month? _____

_____

5. LIVELIHOOD

5.1. Which activities do you consider the most important for your household's livelihood? (in prioritized order, including off- farm and on-farm activities, subsistence- and cash-crops) ***(if respondent can not come up with more than two it is okay)***:

Now	***(Ask by saying their age 10 years ago e.g. "when you were 40" if they are 50)*** When you were x years old
1.	1.
2.	2.
3.	3.

5.2. Do you see yourself having a better life now than when you were XX years old? ***(since the informant was 10 years younger)***

☐ Yes ☐NO ☐ Not sure/ Do not want to answer

[1] Called "empty land" on iban

If yes

5.3. What do you think has caused that you have a better life now?

_____

_____

_____

6. DEVELOPMENT SCHEMES

6.1 Does your household cooperate with the SALCRA scheme?:

☐ YES ☐ NO ☐ In progress ☐ Does not want to answer

(If no, go to 6.1.5)

***If you cooperate with SALCRA*:**

6.1.1 How many years have you cooperated with SALCRA ***(in months or years)***: _____

6.1.2 How do your household cooperate with SALCRA?

☐ As employee

☐ by leasing land – how many hectares ***(or other measures)*** _____

☐ Other _____

6.1.3 How satisfied are you with the cooperation?

☐Very satisfied ☐Satisfied ☐Neutral ☐Unsatisfied ☐Very unsatisfied

☐ Does not want to answer

6.1.4 (***Optional question***) Please elaborate why:

_____

_____

_____

_____

_____

***If you do not cooperate with SALCRA*:**

6.1.5 Would you like to if you were able to it?

☐ YES ☐ NO ☐ Does not want to answer/ Do not know

6.1.5b (***Optional question***) Why would your household like to/ not like to cooperate with SALCRA?

_____

_____

_____

_____

_____

If yes:

6.1.5a ***(Optional question***) Why is your household not able to co-operate with SALCRA?

_____

_____

_____

_____

6.2 Does your household cooperate with the RISDA scheme?:

☐ YES ☐ NO ☐ In progress ☐ Do not want to answer

If yes:

6.2.1 (***Optional question):*** Why did your household decide to collaborate with RISDA:

_____

_____

_____

_____

Consent:

Can we come back with more questions: ☐ YES ☐ NO

Thank you very much for taking the time to help us with our study!
Do you have something to add or any comments or questions?
If you remember of something you are welcome to find us in the community hall.

Appendix 5

FOREST SURVEY

Forest survey was conducted on the 8 March 2016 at an old secondary forest. This forest survey was participated by UNIMAS students, Khairul and Bermas Sabestian, together with UCPH students, Louise and Jeppe. The forest survey was led by Mr Rampan accompanied by our resource person, Professor Dr. Gabriel Tonga Noweg.

It took 4 hours for us to complete the forest survey. Forest inventory was carried out to identify the diversity of the selected old secondary forest. A total of 30 types of plants were identified in the 20 m x 20 m plot. The diameters at breast height (DBH) of the single standing trees were taken for the record. The students were informed with the local name and the use of the identified plants with the help of the resource person and guide. Meanwhile the scientific names of the plants were identified based on the resource person's guidance and reference book.

Based on the calculation of the recorded result, it is found that the average biomass is 163.74 metric ton/hectare and this shows that this forest is belong to an old secondary forest as the average biomass of an old secondary forest range between 150-200 metric ton/ hectare. Meanwhile the diversity index of the forest is 3.0877. The diversity index is used to measure the species richness and their relative abundances in the forest. Generally, it would range between 1.5- 3.5 and a high forest biodiversity would have a diversity index of greater than 4.

Vernacular Name	usage	Notes
Upak lailh	Food/medicinal plants	hypertension meds
Bintangor	Timber/ medicinal plants	Materials for furniture Latex can be used for fungal infection of the skin
Pingan	Food	Fruits eaten raw
Merudang	Food	Source for vegetables “ulam
Tajar	Food	Fruits similar to “rambutan”
Janang	Timber	Normally used in farms, pole for pepper
Sabung	Food	Source for vegetables “ulam”
Melinjau	Food/medicinal use	Fruits part being used
Engkubai	Food	Young shoots parts used in meals
Pudu	Food	The fruits have sweet taste
Akar Kebedu	Fibre	Can be used as rope, Water sources in forest
Resam	Fibre	Can be used as rope to tight “bubu”

Appendix 6 - List of sources

SSI's;

Source description	Reference
SSI with Norina	SSI1
SSI with man (and wife) in household no 2	SSI2
SSI with Antan (and her husband and friend Josie) in household no 30	SSI3
SSI with Rentap during soil sampling	SSI4
SSI with Biku	SSI5
Interview, green pintu in longhouse	SSI6
SSI Rentaps's daughter	SSI7
SSI with headman 8/3	SSI Headman

Questionnaire;

Source description	Reference
Questionnaire questions, not the data	Questionnaire
Questionnaire data	Q data
Questionnaire notes hh2	Q2 notes
Questionnaire notes hh30	Q3 notes
After interview in Household 2, I had a discussion with Cecilia about it	Q2, IT Cecilia
Questionnaire pilot test with Bacha	Q Pilot test
Questionnaire notes to household number 20	Q4 notes

Questionnaire notes to household number 32	Q5 notes

Observationer:

Source description	**Reference**
General observations	General OBS
Field notes from Arrival day / welcoming party	OBS welcoming

Informal Interviews:

Source description	**Reference**
Soup at Petara house, informal interview, 10/3	IT1

Expert Interview/Talk:

Source description	**Reference**
Expert interview with dr. Robert about Land Rights after the first presentation	EI, Dr. Robert
Informal talk with Dr. Gabriel	IT, Dr. Gabriel

Transect Walks:

Source description	**Reference**
Informal walk around the village on the first day	Transect 1
1st (real) transect walk w. Libau	Transect 2
Transect walk in village	Transect 3

PRA Methods and various:

Source description	**Reference**
Village profiling	VP
Fieldnotes for the social mapping	SM

Fieldnotes for the plantation tour	PT
Ranking of crops	CR
Forest walk	FW
Forest Resource Assessment	FRA
Resource mapping	RA
Historical Mapping	HM
Timeline	Timeline

Oil palm and sustainability in a smallholder community

A case study of the impacts of oil palm plantations for the smallholders of Linsat Batu Kudi, Sarawak

SYNOPSIS | SLUSE ILUNRM | 2016 |
UNIVERSITY OF COPENHAGEN

KATJA KRAGELUND, JEPPE RENDBÆK, LOUISE LUMHOLT, ERIKA SKOV & IDA STIGAARD BRUHN
SLUSE, ILUNRM | SYNOPSIS | 26th of February 2016 | 2425 WORDS

Introduction

This synopsis is our proposal for a preliminary research design. Through our fieldwork we wish to investigate the environmental and socio-economic impacts of oil palm plantations established by the large-scale governmental development scheme Sarawak Land Consolidation and Rehabilitation Authority (SALCRA) for the smallholders in Linsat Batu Kudi.
Linsat Batu Kuti is a small Iban Remun community in a mountainous and forested area. SALCRA has operated in this area for the last 8 years where traditional hill paddy has been converted into oil palm plantations. Additionally, a handful of households have established independent oil palm plantations. Assessing the impacts of the SALCRA scheme will be the main focus while we expect that the newly established Rubber Industry Smallholder Development Authority (RISDA) will be included in the analysis to compare the objectives of the two schemes if relevant (SLUSE village description, Linsat Batu Kudi).

Research Context

The high global demand for oil palm, making it a lucrative cash crop in the Malaysian region of Sarawak, has put pressure on biodiversity and spurred deforestation. Despite these concerns, Malaysian export of palm oil is steadily increasing (Wilms-Posen, et al., 2014: 3). The governmental Sarawak Land Consolidation and Rehabilitation Authority (SALCRA) is seen as a way to reconcile the government's wish to increase production with promoting socio-economic development in rural parts of Malaysia (Wilms-Posen, et al., 2014: 3). Briefly stated, the basic idea behind SALCRA as a scheme is that it aims to convert land considered to be under Native Customary Right (NCR) into plantations for oil palm (Wilms-Posen, et al., 2014; Banerjee & Bojsen, 2005). During the contract period, the rights to develop the land is transferred from the customary owners to SACRA, who becomes the de facto owners (Wilms-Posen, et al,. 2014). The general belief was that a fraction of state intervention was needed, if the process was to be facilitated in a way that promoted a shift in agricultural practices, which benefitted the locals. However, increasing political pressure and goals of profit maximization means that the SALCRA scheme we see today has a somewhat different agenda, or at least multiple agendas.

According to their website, SALCRA works to; "improve the social and economic well being and transformation of the rural people where it operates, is committed to sustainability and social responsibility in its mode of operations. It believes that there is no alternative to sustainable development and will work closely with its participants and stakeholders in pursuit in this objective". Following this objective, it is briefly stated on the website, that SALCRA works for a holistic take on development, considering "people, planet and profit" (SALCRA: 2016a, SALCRA: 2016b, SALCRA: 2016c). However, both the environmental implications as well as

the benefits for the smallholders have been called into question (Wilms-Posen, et al., 2014: 3; Mertz, et al. 2012: 110). This leads us to the following objective:

Objective

Through a case study of palm oil smallholders in Linsat we want to assess how the SALCRA scheme affects ecological and socio-economic sustainability on a local scale, and how these aspects of sustainability interrelate.

Important concepts

The field

When we use the term field it refers to the field we have constructed analytically, namely a community where smallholders are affected in various ways by the intervention of the governmental development scheme SALCRA. Likewise when we look at different ecological impacts it is on an empirically operationalizable scale where the ecological system is limited to the area where the smallholders operates.

Smallholders

It must be emphasized that there are various subcategories within the term 'smallholders'. In this preliminary research design we will, for the sake of simplification, operate with the two terms 'supported' and 'independent' as defined by Vermeulen and Goad (2006). We define supported smallholders as people engaging with SALCRA by leasing out their land to the company or working in SALCRA supported fields. Independent smallholders, we define as those not engaging with SALCRA. It is likely that the reality is another if the implementation of SALCRA has established a strict collective landowner scheme of land leases or joint ventures. If so, we might adjust the two terms to 'land owner' and 'independent smallholder'. This investigation of terms and concepts in the matter of smallholders and landowners, constitutes an important part of our analysis. Land use change and schemes like SALCRA has challenged the regular definition of smallholders and blurred the difference between smallholders, landowners and large scale farmers which will be discussed further as our study unfolds.

Sustainability

We are hesitant to predefine sustainability as we strive to let our informants in the village direct what factors to focus on in the matter of environmental impacts of SALCRA. Through PRA, interviews, and hopefully the establishment of a collective learning platform, we will listen to their perceptions and incorporate them in our discussion of indicators for ecological and socio-economic sustainability. However, we so far expect to focus on soil fertility and loss of biodiversity concerning the ecological impacts and in the matter of socio-economic indicators, focus on income strategy, legal issues and tenure rights associated with SALCRA.

The reason why we use the term sustainability is to use it both analytically to capture environmental and socio-economic development but also to include the discussion of the concept itself in our analysis. We understand sustainability as a hybrid with various embedded objectives that can be used for different purposes. It is one of our wishes that the results from the research questions posed below will contribute to the (from our view) knowledge gap on how these objectives fit or does not fit together in development schemes implemented in rural societies.

Collaboration with counterparts

This study of land use changes and associated impacts will be carried out in collaboration with our malaysian counterparts Anthea, Van, Bermas, and Khairul from Universiti Malaysia Sarawak (UNIMAS). They all have natural science as their academic background which compliment our background in social science. We expect our disciplinary differences to be of great help and generate mutual benefits in the matter of triangulation in methods and analysis. At the time of writing we are exchanging thoughts on research objectives and we strive to balance our different interests and expertise so we can establish a common research strategy. Currently we have reached a common ground regarding the focus on the environmental and socio-economic impacts of SALCRA on village scale. However, we are in continued negotiation since they have a much broader focus on both palm oil, rubber, rice and other cash crops. We now try to find a compromise and settle collectively on a research objective that meets both their broad interest and our focus on SALCRA.

Research questions and applied methods

In this section we will unfold what means we imagine is needed in order to answer the research questions (RQ) we have identified as important for our objective. A more visualized overview is provided in our data matrix (appendix 1).

RQ1: ***How are different stakeholders involved in the Linsat palm oil scheme?***

1.1 *Which stakeholders are involved in the Linsat palm oil scheme?*

We will strive to get an overview of which stakeholders are involved in SALCRA and which are not. Our presumption is that a large percentage of the village members are involved and if they are not, they have independent oil palm plantations (Cooke 2012: 243, Cramb & Sujang 2015: 129).

This overview will be obtained through questionnaires and various types of community mapping. Informal conversations and semi-structured interviews should additionally provide information of how and why different stakeholders are involved in SALCRA. Moreover the questions on *what*

the requirements there are for getting accepted to receive support from SALCRA can help us get an understanding of how difficult or easy it is to become a part of the scheme. We aim to identify which smallholders actually have the opportunity to engage with SALCRA in order to analyze the equal or unequal opportunities for the community members in Linsat.

1.2 *What different objectives relate to the different stakeholders?*

In order to further investigate the equal or unequal opportunities to engage in the SALCRA scheme we want to assess independent smallholders' reasons not to engage in the scheme. This sub question strives to capture both the smallholders that actively decide not to engage in the scheme, and those, who for various reasons, do not have it as an opportunity. The arguments and reasons for not participating or simply not having the opportunity to participate in the SALCRA scheme are important, as a way to understand the disadvantages and limitations in engaging. By asking smallholders within the scheme what their reasons are to engage, we get an insight into the considerations behind converting to oil palm plantation, and to what extent it was their own choice. Through semistructured interviews we want to assess their different strategies for land use in order to analyze how their planning horizon is, to what extent is it an opportunistic strategy or a survival strategy.

1.3 *What characterizes the different stakeholder's relation?*

Through semistructured interviews we will try to answer *how much influence smallholders engaging with SALCRA have on decisions affecting them*, and if SALCRA is a top-down or bottom-up relationship - both in relation to what SALCRA expresses and in relation to what the smallholders experience themselves. Moreover we want to assess *how the relation is between the smallholders involved in SALCRA and the independent smallholders* in order to get some qualitative data on possible social or economic inequalities.

Our presumption is that the presence of SALCRA in the area may have increased already existing inequalities within the community[1]. If this is the case it might be relevant to assess not only the relations between supported and independent smallholders but also consider smallholders not cultivating oil palm. As it can be a sensitive issue, most of this data will be obtained through participant observation and informal interviews, but if a key informant seems open to the topic we will strive to include it in a semistructured interview.

By doing social-community mapping or a venn diagram with community members, we can visualize how the different actors relate to one another.

[1] As our investigation is an analysis on local scale we focuses on the inequality within the community, where literature shows that the economic success of converting to palm oil production varies between the smallholders (Mertz, et al. 2012, p. 109-110). But a tendency on a larger scale has also been identified, where the economic development as the effect of the palm oil boom is shown to benefit the population in an unequal manner.

RQ2: *What are the environmental impacts associated with the SALCRA scheme?*

2.1. *Which land and land use changes has occurred since the SALCRA intervention?*

Through resource mapping, community walks and the use of timelines we will obtain knowledge about the community's practices and land use changes that have occurred. Afterwards we plan on using satellite images to triangulate the information collected from the village.

We would like to compare hill paddy soil with oil palm since that is one of the dominant conversions. We could in that case use oil palm soil as indicator for development impacts and paddy as a baseline. We may also compare independent smallholder oil palm fields to a plantation oil palm under SALCRA. We will be using the soil organic matter as an indicator for assessing the soil fertility.

2.2 *What are the main environmental impacts as perceived by the village?*

To assess how the people in the village perceive the environmental impacts of oil palm production we will be focusing on the possible changes in biodiversity. It has been decided not to define biodiversity in advance but rather let the villagers point us to what aspects of biodiversity, they find important.

Apart from looking at the biodiversity, the investigation will also include their perception of the changes in soil fertility under oil palm cultivation. This will be compared to the people's perception of soil fertility under rice production and other land uses we find relevant.

RQ 3: *What are the socio-economic impacts associated with the SALCRA scheme?*

In order to assess socio-economic sustainability of SALCRA we have chosen an empirical focus on “socio-economic impacts”. To do so, we mainly work with three indicators; the smallholders’ *perception* of the land use changes, *income* sources and *distribution*, and the legal aspects in the form of *tenure* rights and SALCRA requirements.

3.1. *What are the main differences between traditional practice and being a part of SALCRA as perceived by the smallholders?*

We have a pre-assumption that the land use changes imposed by SALCRA have had social as well as economic implications for the village members. We aim to identify what possibilities and constraints the smallholders associate with the transition from traditional practice to large scale

oil palm plantations[2]. Thereby we include the affected village members in the identification of socio-economic impacts. To this we will use PRA methods of ranking matrices, and conduct focus group interviews. The data will also be used to direct and qualify additional semi-structured interviews. An important reflection in interviewing respectively 'supported-' and 'independent smallholders' is that they are not homogeneous groups; the categories may prove artificial or misleading and there may be conflicting opinions within such "groups".

3.2 *What characterizes their income sources and -distribution and have they changed since SALCRA?*

Sarawak has experienced a transition from diverse subsistence cultivation to monoculture and cash-crops (Cramb, 2006: 27), and in this question we assume that this is of some importance for their economy and livelihood. Furthermore, studies have shown that the economic benefit from participating in oil palm schemes varies from household to household (Mertz, et al. 2012: 109-110). It depends on factors such as labour, commodity prices, infrastructure etc. (Cooke, 2012: 250). Thus, it is interesting to investigate what the economic consequences are, specifically for Linsat. As an indicator, we will look at *how much smallholders in Linsat rely on subsistence economy compared to money economy before and after SALCRA*, and *how much smallholders in Linsat rely on on-farming productivity compared to off-farm before and after the SALCRA intervention*. In order to assess this, we will use PRA methods of ranking and timelines.

3.3. *How are tenure rights related to the socioeconomic impacts of the SALCRA intervention?*
Finally, as an important component of legislative rights, we wish to assess *how the tenure right system was before the SALCRA intervention and how is it now*. The traditional Iban land tenure scheme was centered around longhouse communities, and membership of the longhouse was a prerequisite requirement for obtaining rights to the land, even though individual households held the property rights (Cramb & Wills, 1990). This practice however appears to have changed, which we wish to investigate through interviews and timelines with smallholders as well as SALCRA representatives. In order to assess this question we may also consider policies beyond SALCRA, such as the Sarawak land code which has been under attack for not considering traditional ways of managing tenure (Perera, 2009: 126-148).

[2] This research question build on the assumption that the SALCRA scheme has led to a degree of specialization / monoculture, as contrary to a previous diversified cultivation. This assumption builds on studies pointing to a tendency of demise in swidden cultivation and expansion of "mono-cultural commodity production" (Fox et al 2009:319).

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Appendix 1- Data Matrix

Objective:
Through a case study of palm oil smallholders in Linsat we want to assess how the SALCRA scheme affects ecological and socio-economic sustainability on a local scale, and how these aspects of sustainability interrelate.

Research questions	Sub questions	Sub sub question	Data required / variables to investigate	Methods / Activities	Equipment	8. Important and critical assumptions/reflections
1. How are different stakeholders involved in the Linsat palm oil scheme?	1.1 Which stakeholders are involved in the Linsat palm oil scheme?	1.1.1 Which households/community members engage and do not engage in SALCRA	Overview of who engage in SALCRA	- Venn diagram, community mapping - Focus group interviews - Semi-structured interview - Questionnaire	Large paper, pens, dichtaphone, GIS	
		1.1.2 What are the requirements for getting accepted to receive support from SALCRA? What are the continued requirements?	Get an understanding of how difficult/ easy it is to become a part of SALCRA scheme	research on SALCRA webpage and semistructured interviews	dictaphone	Preassumption: E.g. if the community members need to do management plans, monitoring and written evaluations. Is this the case it could surface inequalities of e.g. educational level because only the community members who can read and write will have the opportunity to meet these requirements. Lack of transparency can be an issue if SALCRA distribute information in a too professional writing . Furthermore the workload of management plans is often demanding for poor households.
	1.2 What different objectives relate to the different stakeholders?	1.2.1 What are the reasons that independent smallholders do not engage in SALCRA?	Qualitative data on the arguments and reasons for not participating in the SALCRA scheme	Semistructured and unstructured interviews	dictaphone	(is it a part of a long term or short term strategy/ what does it say about their planning horizon). This sub question strives to capture both the smallholders that actively decide not to engage in the scheme, and those who for various reasons dont't even have it as an opportunity.
		1.2.2 What are the smallholders' motivations in engaging with SALCRA?	Get a view of what the smallholders sees as the benefits of engaging with SALCRA	Semistructured and unstructured interviews	dictaphone	(is it a part of a long term or short term strategy/ what does it say about their planning horizon). In what extend is it and opportunistic strategy or survival strategy?
	1.3 What characterizes the different stakeholder's relation?	1.3.1 How much influence do smallholders engaging with SALCRA have on decisions affecting them?	-SALCRA's perception of how much ownership the smallholders have -Smallholders' own perception of their influence (top-down or bottom-up?)	Semistructured interviews	dictaphone	
		1.3.2 How is the relation between the smallholders involved in SALCRA and the independent smallholders?	Qualitative data on possible social and economic inequalities	Semistructured interviews Social mapping (PRA)	dictaphone large paper pens	As it can be a sensitive issue the mostly of this kind of data will be obtained through participant observation
2. What are the environmental impacts associated with the SALCRA scheme?	2.1 Which land and land use changes has occurred since the SALCRA intervention?	2.1.1 Which crops have been converted / changed?	List and quantitative data of crops before and after SALCRA intervention	Resource mapping (PRA) - Community walks - Timeline - GIS /GPS - Quantitative data	Large paper, pens, printed map of area, GPS	Be aware that new land may have been included, and that the establishment of oil palm may not have been only by replacing crops
		2.1.2 How has the sizes of the area (areal) changed?	Mapping of crops on community land (before and after)	- GPS / GIS - community walk	Large paper, pens, printed	Have new areas been included / old abandoned? Have the cultivations

		2.1.3 Which changes has occurred in agricultural practice and land use customaries?	working hours pr. day pr crop or forest harvesting, overview of fertilizers, tools, etc.	- Ressource mapping (PRA) - Ranking (time used pr crop and time used pr type of land use customary) - Semi-structured interviews	Large paper, pens	E.g. maybe they use more ploughing, fertilizer, time and labor etc. in the palm oil scheme. Or maybe the other way around. Have they reduced the time spent on forest harvesting or completely stopped this costume?
		2.1.4 What are the impacts on soil fertility?	Soil Organic Matter (SOM)	Soil sampling	Soil core sampling - small diameter	Consider the possibilities to get access to the smallholder's plantations for doing soil samples . Consider which plots we compare
			Quantitative data on palm oil ecological implication	Literature review (databases, research already made)		Be aware that the ecological implications may be very contextspecific - thus we cannot use it to say what the ecological implications are in Linsat, but only as comparison / inspiration on where to focus
	2.2.What are the main environmental impacts as perceived by the village?	2.2.1 Is biodiversity loss / habitatloss or land scarcity experienced as an issue?	local peoples perception of biodiversity changes	- semi structured interviews, - community mapping - focus group interviews	dictaphone Large paper pens	Habitat loss --> species loss. How does this disturb the ecological balance. + maybe the palm oil monoculture reduces the ressistancy against pest and diseases because some of the predetors (e.g. insects) loose their habitats, sources of food, breeding sites etc. they may not work with the concept "sustainability".
		2.2.2 How do they perceive changes in soil fertility?	local perception of changes in soil fertility	- semi structured interviews, - community mapping - focus group interviews	dictaphone Large paper pens	may not be any changes at all or any of significance
3. What are the socio-economic impacts associated with the SALCRA scheme?	3.1 What are the main differences between traditional practice and being a part of SALCRA as perceived by the smallholders?	3.1.1 What possibilities and constraints do smallholders see in growing oil palm?	Qualitative data of smallholders' opinion on pros and cons of oil palm plantation	- Ranking matrices (PRA) - semistructured -unstructured interviews focus group interviews	Large paper, pens, dictaphone	they may not work with the concept "sustainability". Also be aware that "smallholders" are not a homogeneous group, and that there may be conflicting opinions. (goes for all the below questions)
		3.1.2 What are the smallholders' considerations about changing land use practices and approaching either specialization or diversification of crops?	Qualitative data on livelihood strategies	- Semi-structured interviews - ranking matrices (PRA) - focus group interviews	Large paper, pens, dictaphone	What is the base behind the farmers land use decisions e.g. Food security? How big a risk are they willing to take for a bigger income? (moral or or political economy?)
	3.2 What characterizes their income sources and -distribution and have they changed since SALCRA?	3.2.1 How much do smallholders in Linsat rely on subsistence economy compared to money economy before and after SALCRA intervention?	Qualitative data on livelihood strategies	- Ranking matrices (PRA) - Focus group interviews - Time line (PRA)	Large paper, pens, dichtaphone	e.g. what kinds of land use practices contribute to a subsistence/ money economy and to which extend? For instance how much do they rely on subsistence from forest harvesting before and after? How is their access to the market? Have they itensified subsistence crops to sell the surplus on the market?

		3.2.2 How much do smallholders in Linsat rely on on-farming productivity compared to off-farm before and after the SALCRA intervention?	Qualitative data on livelihood strategies	- Ranking matrices (PRA) - Time line (PRA) - Questionnaire?	Large paper, pens	E.g. have some of the household members migrated to the city or other comunity for wage labour?
	3.3. How are tenure rights related to the socioeconomic impacts of the SALCRA intervention?	3.3.1 How was the tenure right system before SALCRA intervention and how is it now?	Overview of the tenure rights and changes in tenure rights and possible conflicts related to it	Semistructured interviews Research in local legislation Time line	Large paper, pens, dictaphone	

Appendix 2 - TIME TABLE: ACTIVITIES DURING FIELD WORK

Overall activity	Specification	28-Feb	29-Feb	1-Mar	2-Mar	3-Mar	4-Mar	5-Mar	6-Mar	7-Mar	8-Mar	9-Mar	10-Mar	11-Mar	12-Mar
	At Kuching														
Arrive	At Linsat														
Presentations															
	Oil palm (old)														
	Oil palm (new)														
	Rubber														
	Rice														
Soil Sampling	Buffer (if we need one more soil sample)														
Participant observation	*(conducted through out the fieldwork, but emphasized in the first days)*														
Community Walks															
Timeline															
	Before														
Focus Group Interviews	After														
Community mapping															
GPS	(Continuos mapping of interviews / activities														
	meassurement of area sizes														
	Salcra														
	community members														
Key informant interviews (SSI)	head man														
Ranking	Ranking I, II, III, IIII														
	Pilot testing														
Questionnaires	Conducting questionnaire interviews														
Household interviews (4 or more)															
Leaving															

Appendix 3 - Detailed time schedule

Initial reflections on day-planning:
We are 5 Danish students, 4 Malaysian students and 2 translators. For the days where the activities noted does not add up to 9 persons, we imagine that the last person(s) would have time to prepare interview or collect / organise the data collected so far. We have planned the activities so that there is no more activities that the translators can cover, and which seems plausible for them to carry out.
We imagine that we will take the time every morning to collectively make a plan for the day, and in the evening we aim to take time to a sum up meeting and planning of the next day. We also strive to have a evening break for casual socializing with each other to reload. As mentioned in the introduction this is our suggestion, which will of cause be adjusted in collaboration with our counterparts as well as the translators.

Day	Activity and number of persons	Comments
Before fieldwork		
February 28th	Collectively adjust time plan for the week research and research objectives / priorities	
February 29th	Final preparations of questionnaires and interview guides in collaboration with Malaysian students (all) Conduct pilot survey with translators	
During field work		
March 1st	(Arrival date) Informal socializing with community (all) Participant observation (all)	We strive to have a high level of informality and time to socialize for the first day.
March 2nd	Participation observation (all) Community Walk (2-4 persons) GPS (combined with the walk) Timeline, ranking & community mapping (2 persons) as an informal way of getting to know the community	Community walk in this sense would be to informally walk around and get to know the community. PRA methods would also be explorative and used as a conversation starter
March 3rd	Participation observation (all) Community Walk (2 persons) GPS (combined with the walk) Timeline, ranking & community mapping (2 people) Iinitial interview with the headman (2 people) First explorative focus group, along with PRA methods(2 persons, 1 translator)	As the day before we strive to engage in informal and explorative activities We consider an initial interview with the headman in order to hear more about the current land use changes, and get suggestions on who to talk to / how to direct our research During the community walk we need to start considering where to take the soil samples, and we could ask the headman about where to take them. Important to start making appointments
March 4th	Presentation	All
March 5th	Soil Sampling (min. 3 people) GPS & transect walk combined with soil sampling	We need three people for soil sampling; one to do the soil sampling, and two to shield if there is rain. They can also help take notes and mark samples

	Key informant interview with SALCRA (2 people, 1 translator) Key informant interview with community members (2 people, 1 translator)	We might want to do several key informants interviews, and would thus need a few more people, or do a couple of interviews in a row If we find that a translator is needed for the transect walk, 2 people along with the translator would have to do the interviews, that they have time to. Remember the gift we have bought for key informants
March 6th	Soil Sampling (min 3 people) GPS - combined with soil sampling Key informant interviews SALCRA (2 persons, 1 translator) Key informant interview community members. (2 people, 1 translator)	Same as above
March 7th	Soil Sampling (min 3 people) GPS - combined with soil sampling Perhaps more key informant interview with community members (2 people, 1 translator)) Questionnaires – 2 people, 1 translator (2 transator and 2 more people if we do not need more key informant interviews	
March 8th	Soil Sampling (min 3 people) GPS - combined with soil sampling Questionnaires – 4 people, 2 translators	
March 9th	Soil Sampling (min 3 people) GPS - combined with soil sampling Household interviews I: 2 people, 1 translator Household Interview II: 2 people which could be the same as above. (More household interviews)	
March 10th	Soil Sampling (min 3 people) GPS - combined with soil sampling Household interviews I: 2 people, 1 translator Final focus groups, along with PRA methods (2 people, 1 translator) (More household interviews)	For focus group reflections, see Appendix 4.
March 11th	Presentation Farewell party	

Appendix 4

Elaborated methodological reflections

Table of content

Qualitative methods

1. Participant observation

Participant observation will be conducted continuously, but especially during the first 1-2 days with informal small talk and walks around the community. This can direct our research focus e.g. with information about whom to interview etc.

In participant observation the researcher has a parallel/double role: a part of the actions they observe and in the meantime contributing to create them. The researcher is not fully integrated in these actions because of the researcher position.

2. Focus group interviews

We plan to do at least two focus interviews of a duration between 1-2 hours max. The first one can be used exploratively and also be used as a platform for explorative PRA methods like the initial space related methods - e.g. simple community mapping and transect walks. This first focus group interview can hopefully also give us a better idea of where and with whom to carry out our semi-structured interviews and other more focused methods.

The method is particularly important for research question 3.1 "*What are the main differences between traditional practice and being a part of SALCRA as perceived by the supported smallholders?*" and 3.2 "*What characterizes their income sources and -distribution and have they changed since SALCRA?*", but also 2.2. "*What are the main environmental impacts as perceived by the village?"*

We want to use these explorative methods to get an overview of the community, the physical and social environment, and get a first impression of their attitude towards SALCRA and the palm oil plantations.

Sampling:

- Depending on the situation when we arrive, we plan to separate our first focus group in groups with internal similarities, e.g. supported smallholders in one group and independent smallholders in an other, or potentially separate men and women in order to mitigate some of the major challenges with getting everybody participate. In the second we can consider mixing the groups more, when we have a deeper understanding of the social dynamics in the village.

Opportunities:

- With focus group interviews we can collect data about the social dynamics between smallholders and not only the individual attitude. This method is useful to get insight in social norms and values, explore group contradictions, uncertainties, behaviours and attitudes - dynamics that are unlikely to be captured in individual interviews.

Challenges / things to be aware of:

- Social rather than individual performed attitudes: The opinions expressed in these forums often reflect what participants think is appropriate to say in front of the group, therefore extreme or controversial attitudes are less likely to be expressed (e.g. if there is a broad consensus in favor of palm oil plantations, participant with opposite opinion - especially if they are of lower status - will maybe not feel comfortable to speak out.)
- It is important to remember that the opinions expressed are circumstantial and contemporary (the environment can shape and alter their understandings and expressions in situ)
- Can be biased through recruitment / sampling (whom are invited to participate)
- Suitable as pre-pilot study, not suitable to get specific background information on specific research topic, but it can give an idea of what needs further examination.

In sum: → it is important to triangulate findings with other methods like in-depth individual interviews and participant observation.

3. Semi-structured interviews

We want to conduct semi-structured interviews with smallholders - both those participating in the scheme and those who don't, and hopefully a couple of representatives from SALCRA. We strive for a balance between open conversations (to capture as much information as possible and not ignore issues we are not aware of) and some sort of guiding questions to focus the interview on our specific topic and at the same time make comparison between respondents possible to some extend.

The ideal is to get a range of different respondents with different backgrounds and get in depth insight in their individual views on SALCRA, the land use change etc.

Respondents:

- SALCRA representatives (in the city and/or externally)
- Supported smallholders
- Independent smallholders

The semi-structured interviews are relevant to a range of research questions, and the form of questioning of course vary according to whether we speak with SALCRA representative or one of the smallholders, and including all aspects in all interviews may prove too extensive. The research questions we expect to somewhat cover are the following:

1.3.1 *How much influence do the smallholders who engage in the SALCRA scheme have on the decision-making affecting them?*
1.2 *What different objectives relate to the different stakeholders?*
2.2. *What are the main environmental impacts as perceived by the village?*
3.1 *What are the main differences between traditional practice and being a part of SALCRA as perceived by the supported smallholders?*
3.2 *What characterizes their income sources and -distribution and have they changed since SALCRA?*
3.3. *How are tenure rights related to the socioeconomic impacts of the SALCRA intervention?*

We want to use this method to get information about various objectives and incentives related to palm oil engagement and which opportunities and constraints do they associate with the land use change. By doing some kind of comparison between respondents we can maybe try to map out the different interests at stake and current debates.

Challenges / things to be aware of:

- Be careful with ‘’why’’ questions to avoid forcing them into defense, especially in terms of sensitive issues like pollution, rural economy, education etc.
- Avoid overlapping questions (especially for some of the above questions which are closely related. Consider question that vary but touch upon issues relevant to several research questions)
- Remember the specific context in which the answer is given, and that we may (unintentionally) shape the way they respond.

Participatory Rural Appraisal (qualitative multidisciplinary approaches)

The idea behind participatory development and PRA is to acknowledge people as subjects (insiders) rather than objects (outsiders). It can be a challenging balance to ensure participation and inclusion and at the same time maintain research ownership. Broadly speaking, there is a theoretical assumption in PRA that bottom-up development strategies are better than top-down. This attitude has also influenced the thoughts behind our research objective and it is important that we are transparent and aware of such presumptions throughout the study and especially in the interpretation of results. Especially as we investigate a top-down governmental development scheme it is important self-critical and aware of our assumptions.

In the researcher-informant relation we will strive to establish a ‘co-learning’ platform through PRA where we (outsiders) and the local people (insiders) share knowledge and create new understandings of the topics in question - in such co-learning working system it would be ideal that the researcher act as facilitator but some kind of ‘consultation’ will most likely occur where we as researcher need to be responsible for directing the process in the collective determination of priorities.

Using PRA methods like mapping and ranking we can get an idea of the different perspectives and understandings apparent in the community by listening to their discussions and arguments for e.g. drawing like this or ranking like that. In this specific study we use a combination of both space related, time relation and relational PRA methods.

We will consider to also include PRA methods in individual interviews, e.g. a ranking can be relevant or timeline if you are suddenly talking about SALCRA history i.a. These PRA sketch methods can complement the note taking and maybe be used as a tool to guide the discussion and make sure that the talk does not get too off topic (because you have something research-relevant you need to produce. It can also be a good icebreaker to include some practical activities.
It could be beneficial to try and use the same e.g. ranking or mapping exercise with both locale rurals and other stakeholders like SALCRA officials. By doing that we can see where the results differ and where they are similar and thereby get insight to different priorities, interests, opinions or agendas (Mikkelsen 2005:98).

4. Community mapping (spatial)

Community mapping is here defined as an umbrella-term for a PRA map where both resource- and social aspects can be incorporated. It can, if it makes sense, be combined with a venn diagram. The mapping of resources and services is important in our case to get a visualization of how the villagers understand the current resource distribution and get an overview of e.g. abundance and/or scarcity, information like distance to the water ponds, forest proximity - and also services and opportunities like palm oil mills, local markets. Doing a separate social map/venn diagram (or incorporate it in the community map) can visualize social relations like household characteristics, relative demography, who participate in SALCRA, family and professional relations, etc. This can contribute to the interviews with initial information about different opportunities for socio-economic development through the palm oil scheme depending on their status, capital, interests etc. It may also indirectly illustrate *"how the relation between the smallholders involved in SALCRA and the independent smallholders is" (1.3.2)*. The knowledge gained here from can also be used to direct our more research specific (less explorative) methods e.g. interviews and questionnaires.

The methods is relevant to use exploratively in continuation of/ or simultaneously with focus group interviews in the initial stages of the fieldwork.

5. Timeline (temporal)

The point with using time tables is to get relevant informants (smallholders) to map out the land use changes (and e.g. social, political) that has occurred since the SALCRA intervention and try to get an overview of the major events/ changes the last 8 years. Furthermore this method may give us knowledge about what the smallholders see as important and crucial changes. We imagine that this methods will be especially relevant for sub question 2.1 *"Which land and land use changes has occurred since the SALCRA intervention?"* and to some extend 2.2. *"What are the main environmental impacts as perceived by the village?"*.

Since we need some more focus and background information to successfully facilitate this time related PRA, we are thinking of carrying it out subsequently to community mapping and focus group interviews. Doing the timeline along with mapping, may also prove meaningful if the informants e.g. want to draw / mark the location where a certain change happened at a certain time.

We can maybe draw different timelines or an integrated one, in relation to each of the following subquestions:
2.1.1 Which crops have been converted / changed?
3.2.1 How much do smallholders in Linsat rely on subsistence economy compared to money economy before and after SALCRA intervention?

3.2.2 How much do smallholders in Linsat rely on on-farming productivity compared to off-farm before and after the SALCRA intervention?

Challenges / things to be aware of:

- We should figure out how they measure/ think of time. Does it makes sense a line indicating 2014, 2013, and so on or is it more appropriate with a line indicating 1 year ago, two years ago? Or should they be free to draw it as they find suitable and then during or after we can ask for specific information about which year etc.?

6. Seasonal diagram / calendar (temporal)

Can be used to get overview of land use changes, workload and labor distribution, important subsistence crops, etc. May prove interesting to sub question 2.1.3 *"Which changes has occurred in agricultural practice and land use customaries?"*
We are however not yet sure exactly where in the research design and process this method should be used, but we keep it up our sleeve if it proves useful.

7. Ranking (relational)

Matrix ranking/scoring method can produce information about participants' different applied criteria e.g. to assess the perceived value of different crops. Follow up discussion of the matrix will reveal reasons of different scores/rankings.

Different types of ranking

- Wealth and well-being ranking- or grouping: participants tend to be more willing to give information in ranking or scoring rather than direct questions about sensitive issues like income. They're more willing (and maybe more able) to give relative rather than absolute values.
- Venn diagram (usually to get information about relation between local groups and organizations, size of the circles indicate the different weights allocated to the groups or organizations by the participants

Ranking matrices are very effective in visualizing dynamics and preferences. They could (and should) be combined with quantitative methods e.g. statistics.

Challenges / things to be aware of:

- One of the things we need to be aware of in the application of ranking methods is that maybe a set of individual or small-group based rankings have all ranked a specific indicator as severe: e.g. soil degradation as the main consequence of SALCRA large scale palm oil etc. But within the specific rankings there can be many differences and individual reasons for the rank which can be of importance and relevance. Therefor ranking should be followed up with or accompanied by individual interviews to get deeper insight in the underlying reasoning behind the ranking and to check up on correlations with respondents' individual experiences.

Quantitative methods

8. Small-scale questionnaires - Also see appendix 5

Questionnaires will be used to get quantitative overview of demography, household characteristics, farming practice, age/gender distribution etc.

Questionnaires can be a relevant tool for sensitive data collection e.g. household economy etc., especially when adequate secondary information, to back up other data, is not accessible. It is also beneficial in getting an overview of how many households participate in SALCRA, and how dependent different households are on certain crops. As with other question based surveys we need take into account some of the pitfalls like bias, incorrect/manipulated answers, intransparent omissions in both questions and answers, and information lost in questionnaire codes. Some of the mistakes can be mitigated by pilot testing but there will always be shortcomings and questionnaires tend to give a static impression of a dynamic reality, why it is again crucial to triangulate with other qualitative research tools.

We plan to use the small-scale questionnaires subsequently to the first focus group interview with key informants. This chronology is chosen because the focus group interview can provide a base level of information that can be used to form the survey so it doesn't start out with incorrect information or an idea not appropriate for the research topic.

9. Soil sampling

Soil sampling will be used to assess the ecological sustainability of the oil palm production taking place in the area surrounding Linsat. More precisely, soil sampling will be used to answer the research questions regarding the environmental impacts of smallholder oil palm production, i.e. sub question 2.1.4 *"What are the impacts on soil fertility?"*. One of the reasons for choosing soil sampling to assess the environmental impact is because of its importance for plants. Soil has many different properties which affect plants used in agricultural production. The soil fertility is also affected by different land use and agricultural practices.

In Linsat one of the changes in land use has been the conversion of hill paddy (bumai) into oil palm plantations. Therefore soils where oil palm is grown will be compared to soils with hill paddy to determine the changes in environmental impact. As we are primarily social scientists in the group we will primarily focus on soil organic matter, and not try to incorporate more parameters than we can manage skill wise and time wise.

A location where oil palms have been grown for a longer period will be preferred. It will be able to give a more accurate result since the impacts on the soil will happen gradually. There will be taken 3 replicates from each site which will be used to calculate an average.

We have, with input from our opponent group considered the following sampling sites

- compare hill paddy soil with oil palm could work if that is one of the main conversions. We could in that case use oil palm soil as indicator for development impacts and paddy as an indicator of before / a baseline.
- Another option is comparing an independent smallholder oil palm field to a plantation oil palm. However in that case, we have to consider if the timeframe for planting is similar between the two fields.

10. GPS & GIS

The GPS will be used to spatially document the range of data collected, most importantly to document where the different soil samples have been collected.

It will also enable us to triangulate some of the information acquired from interviews, community mappings and transect walks about changes in land use. For instance the information gained from locals about changes in crops specific places can be marked using the GPS. We can use GIS (google earth pro or QGIS) to assess the sizes of the areas converted, also with comparison to elder satellite photos to triangulate our own measurements and the information given by villagers. As seen in the photos (the first from 2011, the second from 2016), oil palm plantations has grown significantly.

Final reflections

11. Situationistic sampling and selection of respondents

In relation to most of the above mentioned methods (especially for qualitative methods and quiestionnaire) we consider stratifying along with sampling. With stratification we hope to get more precise results than with e.g. simple random sampling. Stratification can also be less resource demanding than simple random sampling if the units are relatively small and homogenous. We plan to try to stratify people's livelihood both to give us a better idea of demographic characteristics and also guide and direct the applied methods to the relevant respondents. In such stratification it is not enough to divide them in 'supported smallholders' and 'independent smallholders' since e.g. there can be both rich and poor supported smallholders and internal varieties may for some farmers be greater than between the categories. Therefore it will be necessary to further divide into gender, age, income etc. We will try to do both continuous- and post-stratification so we can adjust and focus the strata according to what is found relevant for the research objective. The questionnaire can be used to gather information necessary for the subsequent stratification that is then used in considerations about focus group formation and selection of individual interview informants.

Quantitative analysis - Questionnaire

Pilot testing
During our stay in Kuching we will adjust the questionnaire and pilot test it on supervisors, translators or others. We will also pilot test the surveys when we arrive to the village, either on a household member or with the head man.

Translation
We will make an initial translation with the translators before arriving to Linsat, and adjusts it after second pilot testing. The translation should be written so there is consistency between interviews / translators.

Sampling
We plan to do the questionnaire per household. In that way we get demographic info on more people that the respondents. From reading on community and household norms, it is also our assumption that each household cooperate on cultivation and on sustaining their livelihood. However the category 'household' has to be thoroughly defined after the first couple of days with explorative methods and pilot testing.
We plan to do a semi-randomised sampling, perhaps by geographical proliferation, but will direct it in order to interview both people who are a part of SALCRA and people who are not.

Sample size: Since we have a rather small community we should be able to interview a large proportion of the population, and demographically cover an even larger percentage of the population.

Data needed from questionnaire
- Basic demography about the village
- Information / distribution of people participating / not participating with SALCRA
- Attitude to SALCRA from people who participate and do not participate
- Information on land use and livelihood (subsistence and cash crops)

Questionnaire

(reflections in blue)

1. OVERALL INFORMATION

1.1 Date: _____

1.2 Name: _____ *Consider if anonymity is necessary*

2. DEMOGRAPHY / HOUSEHOLD

2.1 Household name / indicator: _____
2.2 Ethnicity: _____
2.3 How long have you lived in Linsat: _____
2.4 Number of people in your household _____

2.5 Members of family / household

Name and relation to respondent	**Gender**	**Age** (estimation)	**Does the person live permanently in the household?** (home weekly or seasonal?)	**Level of education** (E.g. no formal education, primary education, secondary education, Diploma, university)	**Primary occupation** (e.g. student, farmer, etc.)

3. SOURCE OF INCOME / LIVELIHOOD ACTIVITIES

3.1. What are the most important sources of income for the household (in prioritized order):

1. _____
2. _____
3. _____

3.2. Does your household (someone in your household) earn money on the following activities?
(you can mark more than one box, e.g. "yes, for subsistence", "yes for selling")

Farming: ▢ YES, for subsistence ▢ Yes, for selling ▢ No ▢ Used to

Work in the city: ▢ YES, for subsistence ▢ Yes, for selling ▢ No ▢ Used to

If yes, as what:_____

Remittances: ▢ YES, for subsistence, ▢ Yes, for selling ▢ No ▢ Used to

Forest products: ▢ YES, for subsistence ▢ Yes, for selling ▢ No ▢ Used to

Which(medicinal, edible, timber etc):_____

Sell fish: ▢ YES, for subsistence ▢ Yes, for selling ▢ No ▢ Used to

Other: _____ ▢ YES, for subsistence ▢ Yes, for selling ▢ No ▢ Used to

Other: _____ ▢ YES, for subsistence ▢ Yes, for selling ▢ No ▢ Used to

Under this section we could add variables if we wish to estimate wealth - if we do that we should maybe consider moving it to the bottom, so it is not one of the first question they are presented to.

If we wish to assess income we can also chose to do it as a ranking; as elaborated in appendix 4 about wealth and well-being ranking- or grouping: participants tend to be more willing to give information in ranking or scoring rather than direct questions about sensitive issues like income. They're more willing (and maybe more able) to give relative rather than absolute values.

TENURE & LAND USE

3.1 Does your household cultivate land: ▢ YES ▢ NO
Do you cultivate for subsistence purposes: ▢ YES ▢ NO
Do you cultivate cash crops: ▢ YES ▢ NO

3.2 Does your household own land: ▢ YES ▢ NO

3.2.1 IF YOU DO NOT OWN LAND:
Does your household rent / borrow land:

▢ YES, from whom:_____
▢ NO

3.2.2 IF YOU OWN LAND:
How much land do you own? _____ (hectares)

Do you lease/rent your land to someone: ▢ YES ▢ NO
How did you get the land:

▢ Inherited ▢ Bought ▢ Other: _____

4. SALCRA

Related sub sub questions:

1.1.1 "Which households/community members engage and do not engage in SALCRA",
1.2.1 "What are the reasons that independent smallholders do not engage in SALCRA?" &
1.2.2 "What are the smallholders' motivations in engaging with SALCRA? ". If

4.1 Do you cooperate with SALCRA?: ▢ YES ▢ NO ▢ Other_____

4.1.1 IF YOU WORK WITH SALCRA:

How many years have you cooperated with SALCRA: _____

How do you work with SALCRA? (As employee, by leasing land etc.) _____

How satisfied are you with the cooperation? (Mark with a ring)

Very satisfied Satisfied Neutral Unsatisfied Very unsatisfied

Please elaborate why: _____

(may be too broad for quantitative, study but if included it would answer 1.2.2 "What are the smallholders' motivations in engaging with SALCRA? and 3.1.1 "What possibilities and constraints do smallholders see in growing oil palm?"

4.1.2 IF YOU DO NOT WORK WITH SALCRA:

What do you think about SALCRA operating in Linsat? (Mark with a ring)

Very good Good Neutral Bad Very bad

Please elaborate why: _____

(may be too broad for quantitative, study but if included it could answer 1.2.1 What are the reasons that independent smallholders do not engage in SALCRA?)

WHAT CROPS DO YOU CULTIVATE

Answers to 2.1.1 "Which crops have been converted / changed?"

Field	Crop	Size (acres)	For how long has the field been cultivated with the specified crop?	What was the land used for before?	Fertilizer (Yes / No) *If yes, write which type*	SALCRA (X)	Income from field (maybe too difficult to answer)	Type of ownership
Field 1								
Field 2								
Field 3								

Field 4								
Field 5								
Field 6								
Field 7								
Field 8								

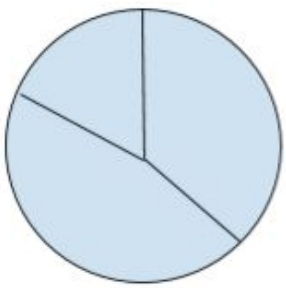
Consent:

Can we use this interview in our study? ▢ YES ▢ NO
Can we take a picture? ▢ YES ▢ NO
Can we come back with more questions? ▢ YES ▢ NO

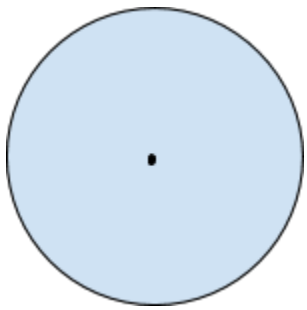
Thank you very much for taking the time to help us with our study!

Other unfinished ideas:
Divisions of circles could be used to visualise priorities / distributions

Example ↓



To draw on ↓



*In order to answer sub sub question 3.2.1 "**How much do smallholders in Linsat rely on subsistence economy compared to money economy before and after SALCRA intervention?**", we could ask them to make a division in the circle on how dependent they are on the following crops for respectively subsistence and cash: oil palm, rubber, peber, hill paddy, rice paddy, etc (a circle for each). (however this would lot give us the perspective of before and after)*

*In order to answer 3.2.2 **"How much do smallholders in Linsat rely on on-farming productivity compared to off-farm before and after the SALCRA intervention**" we could ask them to draw what the most important sources of income are.*

*In order to assess 2.1.3 "**Which changes has occurred in agricultural practice and land use customaries**" especially with regards to working hours per day, we could ask how much time they spend on your own land, on SALCRA plantation on other activities. However again the challenge is the comparison of before and after.*