



Reports

ASEAN-Swiss Partnership on Social Forestry and Climate Change (ASFCC)

Final Activity Report for the Phase 1 (2012-2013)

Kapuas Hulu District, West Kalimantan Province, Indonesia

CIFOR ASFCC Team (Indonesia)

The report is based on several project documents that are not yet published, as well as the research team's interpretations.

Reports

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Abstract

Meaningful and effective involvement of local populations in REDD+ projects is a challenge. The REDD+ project planners often lack information on the resource management patterns that community members employ. Particularly, misconceptions about swidden (shifting cultivation) communities exist among governments and non-governmental institutions, leading to further marginalization of the often vulnerable groups of swiddeners. Swiddening forms an important livelihood option for the rural communities and it is imperative that the REDD+ and other land use management projects in the region incorporate an understanding of swiddening, including the various forms of social forestry and fallow management, in their planning and implementation if the aim is to conduct a successful project. It needs to be also noted that approaches that are termed “participatory” often seek to teach local communities new concepts or methods, but rarely emphasize learning from local communities about their own forest management related patterns and methods of conservation and change.

Furthermore, many conservation and/or development activities and initiatives, whether REDD-focused or not, under-appreciate the mobility of rural Southeast Asians and the information and resource networks in which they participate. These shortcomings have profound impacts on the efficiency and effectiveness of climate-change related activities, as well as the benefits that these communities can hope to realize from REDD+ initiatives. This project seeks to fill these gaps by understanding how local communities that rely at least partially on swiddening can participate more meaningfully in programs focused on promoting REDD+. The project will have two principal objectives: (1) To understand how existing horizontal and vertical social networks can serve to enhance opportunities and diminish obstacles for forest communities to participate meaningfully in and benefit from REDD+ and/or other PES projects; (2) To understand how local knowledge, practice, institutions, and landscape patterns, especially in communities of swiddeners: (a) can be employed to harmonize REDD+ objectives with local practice and thus enhance REDD+ project outcomes, including the effectiveness and efficiency of Measurement, Reporting and Verification (MRV) activities (b) can be enhanced in economic value and in social and political value by REDD+ project activities. The project will achieve these objectives using mixed methods and through collaboration with swidden communities and other relevant actors in the Kapuas Hulu District, West Kalimantan Province, Indonesia.

1. Introduction

1.1. Background and scientific justification: Swidders and REDD+ in Southeast Asia

Throughout much of Southeast Asia, what remains of forests is found in areas where shifting cultivation or swiddening is practiced and where swidders -- frequently disadvantaged minority peoples -- have traditional rights to land and resources (Mertz et al. 2009; Padoch et al. 2007). However, misconceptions about swiddening are common, mainly attributed to almost universal condemnation by both governments and non-governmental institutions (whether devoted to conservation or development). The vulnerable status of swidden populations (Cramb et al. 2009; Dove 1983; Fox et al. 2000; 2009) makes it imperative that REDD+ projects in the region incorporate an understanding of swiddening, including the various forms of forest and fallow management it commonly comprises, as well as of the communities themselves (Mertz 2009). Kapuas Hulu District in Kalimantan, Indonesia, where swidden agriculture is widely practiced and REDD+ projects are planned or underway is an excellent site to focus on these important, linked issues.

One essential issue that tends to be missed or misinterpreted by both governments and non-governmental institutions is the mobility of swidders and the dynamism of their resource use. Despite the often dramatic histories of migration and change of many swidden communities, they are frequently viewed as essentially “traditional”, static, and locally bounded. The many economic and political changes that have frequently occurred throughout Southeast Asia have, however, embedded even seemingly remote rural households and communities in multiple social networks. These networks link people and places, including rural to urban settlements, individuals to organizations, peripheries to centers, yet often remain essentially invisible to outsiders.

For the implementation of a REDD+ project, information and resource networks are essential. First of all, the actual reduction in deforestation and forest degradation needs to be measured and reported within a REDD+ MRV system. An MRV system must also ensure that information gathered is fed into a carbon accounting system, and that it can be verified. The verified performance information will need to be further translated into a financial transaction inside a larger REDD+ system, and cost and benefit sharing mechanisms need to be in place to provide incentives to people, communities and institutions at different levels.

Hence, identifying and using the existing networks is key to help the communities accessing information and marshal resources to participate more effectively in REDD+ and other climate change-related activities. The existing networks could potentially serve as channels where the information related to carbon stocks in the swidden system is gathered and shared; through which monitoring data is reported to other levels; or where financial resources or other benefits are exchanged. However, the existing networks in swidden communities for information and resource exchange is not yet well understood, and knowledge gaps continue to exist.

2. Objectives and research approach

2.1. Objectives

This project seeks to fill the above mentioned gaps in knowledge by taking a two-pronged approach to understand how local communities that rely at least partially on swidden agriculture can participate more meaningfully in programs focused on promoting REDD+. The project will have two principal objectives:

1. To understand how existing horizontal and vertical social network structures can serve to enhance opportunities and diminish obstacles for forest communities and their members to:
 - a. Participate meaningfully in and benefit from REDD projects
 - b. Participate in and influence national and subnational REDD decision-making
2. To understand how local knowledge, practice, institutions, and landscape patterns of resource use, especially in communities of swidden agriculturist:
 - a. Can be employed to harmonize REDD+ objectives with local practice and thus enhance REDD+ project outcomes, including the effectiveness and efficiency of monitoring and MRV activities.
 - b. Can be enhanced in economic value and in social and political value by REDD+ project activities.

The project will achieve these objectives through collaboration with communities of swidden agriculturists and research groups and organizations who are planning and implementing REDD+ activities in Kapuas Hulu.

2.2. Research Approach

The project consists of two interlinked but separate main activities. The first part used a comparative approach to study existing social structures and embedded networks in swidden communities and beyond, including rural-urban ties, in four sites in Kapuas Hulu. The research focused on networks in which information and financial resources were shared. Information and financial networks were selected because they are core elements in the institutional architecture of a REDD+ mechanism, and will need to be understood across different levels and scales if the aim is to implement a functioning REDD+ project. In addition, organizations that are relevant to decision-making about forests and forested land and which affect deforestation and forest degradation in the research area were studied. More specifically the following aspects related to these organizations were studied: (1) their positions and perceptions of REDD+, deforestation and swidden agriculture; (2) their reputational power; (3) their networks of information with regard to decisions over deforestation and forest degradation; and (4) their collaboration networks around decision-making over deforestation and forest degradation. This information was expected to provide a deeper understanding of cross-level or “vertical” influence and information flows.

The assumptions were that most networks, including rural-urban ties, will be of an informal nature, even though in most cases formalized network structures would be needed for a transparent, accountable and legitimized REDD+ mechanism. Our hypothesis was that a) transaction costs would be lower if the establishment of REDD+ builds upon existing mechanisms, and b) existing networks and social foci are currently dominated by power asymmetries, thus information flows and financial

streams can be monopolized or influenced by powerful actors. We argued that there is a need to assess in which situations a mechanism such as REDD+ could build upon existing network structures, would need to be modified, or new structures should be created to ensure equitable outcomes.

Mixed and participatory methods were used for the network studies. Participatory observation, focus group discussions and structured and semi-structured questionnaires at the local (community) level and subnational (district, province) level were conducted. For this part of the study, three levels of research were used which are described in the section 4 of this document, as well as in a more detailed internal methods document.

The second part of the project focused on research and capacity-building activities related to the implementation of an appropriate monitoring and MRV design that includes community participation. Previous studies have shown that communities can monitor biomass in relatively simple-structured forests, for example, Tanzanian Miombo woodland and temperate montane Himalayan oak and pine forests (Skutsch et al. 2011). The I-REDD+ study has recently shown that community-based forest biomass monitoring is also possible in diverse tropical forest, even without the use of handheld computers, once community monitors have received brief training (Danielsen et al. 2013). This includes lowland dipterocarp forest in East Kalimantan. The present study takes community-based forest biomass monitoring a step further by addressing all the tree-rich land-use types within the swidden landscape mosaic. This is a landscape type of which even professional foresters and researchers still have very limited experience. The project is therefore not only looking at whether local communities can become involved in biomass monitoring in a meaningful way but also at which carbon pools and which land-use types should be given the highest priority when monitoring biomass in a swidden landscape.

In addition to the participatory carbon measurements, the research includes a land-scape level component that aims to: (a) Analyze the land use and land cover patterns in the study villages; (b) Model the landscape level above ground biomass (AGB) dynamics associated with the land use patterns followed in the villages. This part of the study was started during the phase 1 of the project, and will continue in the Phase 2 more in detail. The study will be conducted using remote sensing data, carbon inventories and modelling.

2.3. Research Questions

The following initial research questions guided the research:

1. What networks exist through which resources and information get exchanged? When, with whom, how and why are the resources and information exchanged?
2. Can these networks (as identified under question 1) be related to the need for multi-dimensional information and financial flows of a REDD+ system (specifically for reporting (R) and benefit sharing (B))?
3. Who in the community has access to resources and information shared through the selected networks?
4. How do socio-economic factors, migration patterns and personal relationships influence access to information and resources?
5. What are the current swidden practices of the farmers, and how have they changed over time?
6. What level of knowledge on REDD+/PES is present in the swidden communities?
7. What are the organizational perceptions of challenges and opportunities for reducing emissions through avoided deforestation and forest degradation at a subnational level?

8. What are the horizontal and vertical information, financial and influence networks related to existing and planned measures to reduce deforestation and forest degradation?
9. In what degree do formal and informal hierarchy, power constellations, discursive practices, and new (financial) incentives, influence and shape the implementation of a mechanism such as REDD+?
10. How can local communities engaged in swidden agriculture become meaningfully involved in REDD+ monitoring and MRV?
11. To what extent are data from monitoring by local communities comparable to data from monitoring by professional foresters?
12. What are the land use patterns in the study villages, and what are the implications of land-use change for the associated carbon stocks in the land-scape?

3. Research team, partners and schedule

3.1. Research team

The ASFCC research team in Kapuas Hulu consisted of members from varying scientific, professional and cultural backgrounds (Table 1). It included a senior and principal scientists, a post-doctoral fellow, research staff, and staff from a local NGO. From the scientific background there were representatives from political, social and ecological disciplines. The local NGO Riak Bumi, Valentinus Heri and his team were especially helpful in assisting coordination, practical arrangements and conducting the fieldwork in the area.

Table 1. The ASFCC research team in the Kapuas Hulu District, Indonesia

Name	Organization	Name	Organization
Moira Moeliono	CIFOR	Aneesh Anandadas	CIFOR
Maarit Kallio	CIFOR	Kristell Hergoualc'h	CIFOR
Cynthia Maharani	CIFOR	Finn Danielsen	NORDECO/CIFOR
Willy Daeli	CIFOR	Michael K. Poulsen	NORDECO/CIFOR
Kharisma Tauhid	CIFOR	Bonafisius Engkamat	Riak Bumi
Bimo Dwisatrio	CIFOR	Landung Atmanto	Riak Bumi
Maria Brockhaus	CIFOR	Valentinus Heri	Riak Bumi
Christine Padoch	CIFOR	Sadikin Muslim	Riak Bumi

3.2. Key partners

The main local partner for the ASFCC work in Kapuas Hulu was the local NGO Riak Bumi, and Riak Bumi staff was also an essential part of the research team. The District, sub-district and local level government officials were also informed as required of the research activities, and these actors provided valuable advice and time for the research team. Welli Aswar from Kapuas Hulu Forest Management Unit and his team of foresters conducted the professional measurements of trees for biomass assessments. The local people in the community level were also highly collaborative and hospitable, and made the research activities possible and smooth.

In addition, the CIFOR/CIRAD partnership project CoLUPSIA (Collaborative land use planning and sustainable institutional arrangement for strengthening land tenure, forest and community rights in Indonesia), especially Yves Laumonier, Nicolas Labriere and Shantiko Bayuni were important partners for the project. They for example kindly provided us background information of the area, socio-economic data from the villages, and guided us in the site selection process.

The design and implementation of an appropriate, community-based monitoring system for carbon and other environmental services for use in REDD projects was undertaken in collaboration with the

Nordic Agency for Development and Ecology (NORDECO). NORDECO is a non-profit research and consultant agency with profound expertise in participatory natural resource monitoring and management.



Figure 1. Scenery of an active swidden next to fallows at different stages. (Photo by M. Kallio)

3.3. Schedule of the work

Table 2. Research Activities in Indonesia 2012-2013

No	Activity	Place	Date	Participant	Output
1	Scoping mission I: ASFCC research in Kapuas Hulu District, Kalimantan, Indonesia.	Kapuas Hulu, Indonesia	May 2012	Moira Moeliono	Trip report. Initial site selection done, collection of background information and developing partnerships.
2	Scoping mission II and Focus Group Discussions (FGD) (I) in the first village	Kapuas Hulu, Indonesia	November 2012	Maria Brockhaus, Moira Moeliono, Maarit Kallio, Michael K. Poulsen (Nordeco), and B. Engkamat (Riak Bumi)	Trip report. Final site selection done; development of local partnerships; finding local field assistants; collection of background information; transect walks; conducting Focus Group Discussions (FGD) in the first village; and pre-testing the ego-network questionnaire.
3	Focus Group discussions (II)	Kapuas Hulu, Indonesia	December 2012	Moira Moeliono, Maarit Kallio, Cynthia Maharani, B.Engkamat (Riak Bumi)	Trip report. FGDs in two villages conducted; transect walks; pre-testing and development of the ego-network questionnaires; collection of background information.
4	Focus Group Discussions (III)	Kapuas Hulu, Indonesia	January 2013	Moira Moeliono, Cynthia Maharani, B. Engkamat (Riak Bumi)	Trip report. FGDs in the fourth village, database and notes
5	Participatory mapping, stratification, plot establishment and measuring trees for carbon estimates	Kapuas Hulu, Indonesia	February 2013	Michael K. Poulsen (NORDECO), B. Engkamat (Riak Bumi), Landung Atmanto (Riak Bumi), Community monitoring team members in Keluin and Benuak Tengah Hilir	Data sampling strategy, manual and checklist for participatory mapping and monitoring of carbon stocks (in English and Bahasa Indonesia), participatory maps produced, trip report, technical report, establishment of 146 permanent plots. Database with information on plots and trees.
6	Analyze of the Kapuas Hulu notes and FGDs	Bogor, Indonesia	April 2013	Maarit Kallio, Cynthia Maharani, Moira Moeliono	Trip report for the FGDs in Kapuas Hulu finalized and systems/networks for the ego-network study selected.
7	Re-measurements of the permanent plots (biomass)	Kapuas Hulu, Indonesia	April 2013	Michael K. Poulsen (NORDECO), B. Engkamat (Riak Bumi), Welli Azwar and his team of foresters from	Professional re-measurements of trees in 106 plots in Keluin and Benuak Tengah Hilir. Data entered into database.

No	Activity	Place	Date	Participant	Output
				Kesatuan Pengelolaan Hutan (KPH) di Kabupaten Kapuas Hulu	
8	Preparations for the organizational surveys in Kapuas Hulu, Indonesia	Bogor, Indonesia	May 2013	Cynthia Maharani, Bimo Dwisatrio (consultation with Moira Moeliono and CoLUPSIA team member)	List of the organizations finalized and as many as possible contacted
9	Organizational surveys	Kapuas Hulu, Indonesia	June 2013	Cynthia Maharani, Bimo Dwisatrio, Maarit Kallio	Trip report. Organizational questionnaires conducted, transcription and translation started
10	Ego-network questionnaires conducted	Kapuas Hulu, Indonesia	August 2013	Maarit Kallio, Cynthia Maharani, Kharisma Tauhid, Willy Daeli, B. Engkamat (Riak Bumi) and Herming Nds	Trip report. Ego-network questionnaires conducted, transcription and translation started.
11	Database development, transcription, translation	Bogor, Indonesia	October 2013	Cynthia Maharani, Willy Daeli, Kharisma Tauhid and Soraya Nurul Ichwani	Transcription, translation, data management going on.
12	Second round of measuring trees in the permanent plots	Kapuas Hulu, Indonesia	October-November 2013	Michael K. Poulsen (NORDECO), Aneesh Anandadas, B. Engkamat (Riak Bumi) and Sadikin Muslim (Riak Bumi) Community monitoring team membersin Keluin and Benuak Tengah Hilir	Trees measured community-monitoring teams in 106 permanent plots. Data entered into database. Technical report produced.
13	Second round of re-measuring trees in the permanent plots		November 2013	Welli Azwar and his team of foresters from Kesatuan Pengelolaan Hutan (KPH) di Kabupaten Kapuas Hulu	Trees re-measured by foresters in 106 permanent plots. Data entered into database.
14	Finalize the ego-network and organizational interviews	Kapuas Hulu, Indonesia	October-December 2013	Cynthia Maharani, Willy Daeli, Kharisma Tauhid and Herming Nds	Trip reports
15	Data management, transcription, translation, initial analyses and report writing	Bogor, Indonesia	January-March 2014	Maarit Kallio, Cynthia Maharani, Willy Daeli and Kharisma Tauhid	Final report. Clean dataset and transcription documents in English and Indonesian

No	Activity	Place	Date	Participant	Output
16	Reporting back and feedback from the partners	Kapuas Hulu, Indonesia	March 2014	Cynthia Maharani, Moira Moeliono, Bimo Dwisatrio, Maarit Kallio, Willy Daeli, Kharisma Tauhid, B. Engkamat, Valentinus Heri	Final report disseminated. Presentations and feedback notes

4. Methods and tools

4.1. Site selection

Site selection was based on the following criteria:

1. Swidden agriculture is a dominant land use in the community
2. Significant forest cover is present in the village area (including mature forest)
3. There are other specific characteristics of interest (e.g. presence of oil palm as external driver of change, proximity of a natural park etc.)
4. Village is a study site of CoLUPSIA project which allows for improved synergies within the two projects, minimize double work done, and strengthen the use of data collected by the two projects. (In two of the selected study sites socio-economic surveys have been conducted by CoLUPSIA)

In addition, ethnic diversity was considered while selecting the sites, with a preference for villages that were multi-ethnic and consisted of ethnic minorities.

4.2. Focus Group Discussions (FGD)

In total 12 Focus Group Discussions (FGD), differentiated by gender and age (women, men and young people), were conducted in the four selected hamlets in Kapuas Hulu. The FGDs were conducted in order to get a basic understanding on:

1. The environmental, economic and social characteristics of each site.
2. The existing resource and information exchange systems and embedded networks (within the community and beyond).

A 'system' in this study was defined along the following dimensions: (a) resources that are exchanged (money, information, skills, material); (b) actors (who is exchanging resources); (c) purpose (why are the resources exchanged); (d) social foci and tools facilitating the exchange (where, when and how the exchange is done). As such systems can be identified also through the identification of institutions with their structure or rules, actors and resources and relations and exchanges. These systems and the embedded networks were the basis for the follow-up ego-network surveys as described in the following section (4.3).

The focus group discussions further provided information for answering to the general research question number 1, namely:

1. What systems and networks exist, through which resources get exchanged? When, with whom, how and why are these resources exchanged?

Participatory approach and a set of tools were used during each FGD. The specific steps followed were:

1. Warming up, introduction of the project (and us) and the purpose of the FGD.
2. Understanding history of the area/longhouse (important events in the past influencing community's life).
3. Understanding the specific past events influencing the land use, economic situation and wellbeing of the communities.

4. Identifying examples of about what information and economic exchange “systems” exists in the village. Further how, with whom (in which levels), where and when this information is exchanged and economic transactions are made.
5. Rank the importance of each “system” for community’s social and economic well-being (ordinal ranking used, but more than one system could have the same importance)
6. Specify the social-foci for each “system”, where, when, how, with who the information was exchanged, and discuss about the importance of the social-foci for the specific system
7. Wrap up and follow-up discussion with the community, questions from them to us, explain again the purpose of the FGD if required

Each FGD took approximately two hours to conduct. Material used included: big and small papers, stickers, tape, markers, snacks and tea and coffee. Each FGD was recorded in order to be able to check unclear points. In addition to this report, a more detailed trip report have been prepared on the three separate FGD trips in the selected four villages. Also notes and photos have been taken during the FGDs, and the raw material stored for future needs.

4.3. Ego-network questionnaires

Drawing from the information gained from the FGDs, the household level ego-network survey sought to gather data aimed at answering the following questions:

1. How are resources and information exchanged within and beyond swidden communities?
2. Who in the community has access to resources and information shared through the selected networks?
3. How do socio-economic factors, migration patterns and personal relationships influence access to information and resources?
4. Can the selected networks (see below) be related to the needs for multi-dimensional information and financial flows in a REDD+ system (specifically for reporting and benefit sharing of REDD+)?
5. What are the current swidden practices of the farmers, and how have they changed over time?
6. What level of knowledge on REDD+/PES is present in the swidden communities?

Based on the FGDs, the three most strongly related and/or strongly influential networks over potential REDD+ activity in the study villages were selected based on the following criteria:

1. Within the system/network there are links to different actor groups that would be/ are relevant for the implementation of REDD+ (e.g. GOs, NGOs, donor agencies, etc.).
2. The system/network includes benefit or finance sharing elements, as benefit sharing (monetary and non-monetary) will be part of a REDD+ design.
3. The system/network has a link to government agencies or other actors that conduct monitoring or reporting activities such as collection of statistical information, since an MRV mechanism for REDD+ will need reporting structures.
4. The system is related to land use change (especially related to changes in forest cover). The similarity with a REDD+ mechanism would be that REDD+ intends to influence forest related land use change.

Kapuas Hulu is a remote district and monitoring and reporting is generally weak and limited by the capacity of village heads to gather and present information to a higher level of bureaucracy. With a large area of intact forest, Kapuas Hulu has attracted interest of a various actors. However, local people have little direct contact with these actors. One of the few actors directly connected to local people is the Credit Union providing saving and credit facilities to members. This institution regularly

visits the longhouse to collect saving and/or credit instalment and record it in a report book (monitoring and recording) and by the end of the year, they report back to their fellow members (through annual meeting).

Thus the systems selected for the detailed ego-network surveys were selected fulfilling the above-mentioned criteria as well as possible, but not all of them in all cases. The selected systems, and their relation to the selection criteria are described in the Table 3.



Figure 2. Conducting ego network survey at the newly opened swidden. (Photo by M. Kallio)

Table 3. Description of the selected systems for the ego-network study in Kapuas Hulu

Name of the system	Criteria 1 Actors (potential)	Criteria 2 Benefit sharing	Criteria 3 Monitoring and reporting	Criteria 4 Land use change
1. Fertilizers and herbicides (<i>Pupuk dan obat</i>)	Community members, members of local rubber farmer organization, local trader, sellers in larger towns, relatives and other people in Malaysia or other places, private sector/companies, government.	Fertilizers and herbicides and information on their availability or use.	Monitoring by local communities. In case of government subsidies, reporting by the village head.	Strong link to land use change due to ability of these products to make the agriculture more permanent and improve the productivity.
2. Credit and loan system (<i>Kredit dan pinjaman</i>)	Credit union, relatives, neighbours, friends in the area or migrated to other locations. Banks or other investments.	Information on loan/credit opportunities, share in the interest, other benefits such as health/life insurance.	Visits and accounting by the CU; reports by CU. Recording loan and balance sheet by rubber trader (who give advances to rubber farmers).	Link to land use change as most of the activities for which the loan is asked for are related to land use.
3. Customary land use system (<i>Adat tentang tanah</i>)	Local leaders, community members, government officials, private companies.	Information on land (land boundary, new swidden location, exchange labor activities), other benefits.	Annual ritual where information is shared on the year's happening <i>Adat</i> meetings with the <i>Tumenggung</i> .	Strong link to land use.

Ego-network questionnaires were conducted with the household heads. The aim was to select randomly minimum 40 households per community for the interviews depending on the size of the population in each site. If the selected community consisted of less than 40 households, all the household heads were selected into the sample.

The survey questionnaire included the following distinct sections:

1. Basic socio-economic attributes of the informant and household, including any formal roles and organizational memberships that the respondent may have
2. Household ties related to each selected system/network
3. Household links to urban centers and other migration destinations
4. Experiences related to REDD+ and PES (Payments for Ecosystem Services)
5. Swidden practices.

The main hypothesis tested was that specific socio-economic factors and migration experiences, as well as kin ties to specific people determine actors' access to existing informal and formal structures across communities, between them and in rural-urban interactions. This access to informal and formal structures and networks influence the community member's access to information and resources.

The field team digitally recorded all household interviews for transcription and translation, as well as took detailed notes during the process. Key informant interviews were also carried out in addition to the household sample, including village leaders, farmers and traders. These were also recorded where possible, while in some cases notes were taken instead.



Figure 3. CIFOR scientists and local key informant. (Photo by M. Kallio)

4.4. Organizational survey

An organizational network survey at the subnational level (Kapuas Hulu District and Pontianak) was conducted in order to study the following initial research questions:

1. What are the organizational perceptions of challenges and opportunities for reducing emissions through avoided deforestation and forest degradation at a subnational level?
2. What are the horizontal and vertical information, financial and influence networks related to existing and planned measures to reduce deforestation and forest degradation?

3. In what degree do formal and informal hierarchy, power constellations, discursive practices, and new (financial) incentives, influence and shape the implementation of a mechanism such as REDD+?

In addition, the existing knowledge and policy proposals for REDD+ were assessed.

The survey was administered to high-ranking representatives of pre-identified organizations and actors ranging from community heads, to representatives of governmental and non-governmental organizations. After the initial set of pre-defined actors a snowball sampling was used.

The relevant actors and organizations selected for our study were the ones that: (a) were most influential in making decisions and implementing activities that affect forests or forested areas; (b) or distributed information relevant to forests and forested land in the research area. The actors were defined by a review of project reports, administrative hierarchies etc. and verified during an initial scoping trip in the research area. The selected actors could be divided in different categories (private sector, GOV, NGO, INGOs, research, media, etc.) and they were active at various subnational levels (community, sub-district, district, province, etc.). National level actors were not included in the follow up snowball interviews, however the links were noted. Actors could also be specific departments or subgroups in a larger organization (e.g. specific forest department units). The aim was to have a highly ranked official or expert representing the interviews.

The organizational questionnaire had three distinct sections. The first section identified the type and some specific characteristics of the organization, including their major organizational interests. The second section identified actors' positions regarding policy challenges and opportunities. The third section focused on networking among the identified organizations. In the third section, the questions referred to the influence of other organizations, exchange of information, organizations with opposing positions, and organizations with whom there is collaboration. All the interviews were recorded, transcribed, and translated. The data will be analysed using qualitative methods and social network analysis.

4.5. Participatory carbon measurements

Two study sites Keluin and Benuak Tengah Hilir were chosen after the scoping trip where the local communities also were introduced to the concept and plans for this field research. Both communities expressed a strong interest in taking part in the field research.

A manual for the field teams facilitating the establishment of participatory mapping and monitoring of forest and swidden systems' biomass was prepared. A simpler checklist and field forms for the community monitors were also prepared. The communities drew up land-use maps during participatory mapping exercises. During the participatory mapping, the area belonging to the community was discussed and mapped if possible. The area mapped is what belongs to the community according to traditional unwritten laws based on customary rights rather than the area formally registered. Any discussions of disputes relating to land were avoided. Stratification according to local land-use categories and with a focus on tree cover was done during the participatory mapping exercise.

Permanent sampling plots were selected using systematic random sampling (starting point is chosen at random, and choices thereafter are at regular intervals) within each stratum. The manual suggested that the forest cover and land-use map resulting from the participatory mapping activities

should be the basis for stratified random selection of plot positions, as had been done by the I-REDD+ project. Some of the plots selected using the strata drawn on the map resulting from the participatory mapping were not within the anticipated stratum when located in the field. Sometimes, new plots therefore had to be selected in the field when the actual situation of different land uses could be seen. Plots were then established in positions where the last three digits of both the easting and northing UTM coordinates were pre-determined (e.g. 000, 250, 500 or 750). This way we could get plots from within the desired strata without compromising the principles of random sampling. We aimed for at least 15 plots within any stratum with comparably high carbon content.

On arrival at the plot location, the community monitors will select one tree as the center of plot. They will set up two measuring ropes of 30-meters, with the middle at the center of the plot. The first line is oriented along a random bearing; the second line is oriented perpendicular to the first. Markings are attached to the ropes at 9 m from the center. The community monitors will measure all trees with a girth ≥ 30 cm up to 9 m from the plot center and all trees with a girth ≥ 100 cm up to 15 m from plot center. All the trees are numbered, marked, and identified at the lowest possible taxonomic level (using local names).

The main focus of this study is on community participation in above-ground biomass monitoring. Above-ground biomass is, however, only one of the five terrestrial carbon pools defined by the Intergovernmental Panel on Climate Change (IPCC). Deadwood may be an important carbon pool for which community participation in monitoring is relevant. The first steps towards developing and testing simple methods of community participation in monitoring of deadwood have been taken. The deadwood carbon pool can be divided into two, standing and lying.

Standing dead trees are measured using the same criteria as for live trees. The decomposition class of the dead tree is recorded as having no signs of decomposing (tree with branches and twigs that resembles a live tree) or having signs of decomposition (other than loss of leaves).

Lying dead wood will be sampled using the line intersect method. The two 30-meter lines, which are established when laying out the sample plot for AGB monitoring, are used. The diameters of the lying dead wood (≥ 10 cm diameter) intersecting the lines are measured. The first line is oriented along a random bearing, the second line is oriented perpendicular to the first. The dead wood is assigned to one of the three density states (sound, intermediate or rotten) using the 'machete test', as recommended by IPCC Good Practice Guidance for LULUCF.

Information about the other carbon pools' contributions to the total amount of carbon in a swidden area has been searched for in the literature.

All trees measured by the community monitors during February 2013 were re-measured by foresters with professional experience in measuring trees for carbon assessments. Mr. Welli Azwar, holder of a forestry degree from the Universitas Tanjung Pura Pontianak, was hired to be in charge of the professional re-measuring of the trees in 118 plots. The plots in Keluin were re-measured on 19-21 April 2013 and the plots in Benuak Tengah Hilir were re-measured on 13-15 April 2013.

All field data were entered into Excel and sorted in different ways to seek out mistakes. Suspicious values were checked against the original field form and corrected if they had been entered wrongly. Other obvious mistakes were also corrected.

The total tree AGB was estimated using Brown's generic equation (Brown 1997). We also analyzed whether community members and professional foresters measured the same number of trees per plot, measured the same girth per tree, and recorded the same biomass per hectare as estimated per plot. For the analysis of tree girth and number of trees per plot, we used Wilcoxon signed rank tests and a significance level of 0.05. To compare the biomass per hectare, we first square root transformed the data so they would fit a Gaussian distribution. We then compared the mean biomass by a match-paired Student's t-test and compared the variance through an F-test.

The second round of measuring by the community monitors took place during the third period of fieldwork in Keluin on 26-29 November 2013 and in Benuak Tengah Hilir on 1-3 December 2013. In the field, community-monitoring groups were accompanied by Engkamat (Riak Bumi field assistant), Sidikin Muslim (Riak Bumi field assistant) and Michael Kjøie Poulsen (Nordeco researcher). The community monitoring groups would try to remember the position of each plot and re-locate the plots without assistance. None of the community monitoring team members was familiar with the use of a compass or GPS receiver and a project field assistant with a GPS would help locate those plots which the community monitors could not find.

At the plots, the community monitors would first locate and measure the center tree, marked as tree number one. Then they would try to find, identify the species of and measure all marked trees in the plot. Thereafter, they would try to find trees, which had been too small when the plot was established but had now grown to a size where they should be measured (girth ≥ 30 cm up to 9 m from the center and girth ≥ 100 cm up to 15 m from the center).

Aneesh Anandadas, CIFOR Remote Sensing and GIS expert, joined parts of the fieldwork in both Keluin and Benuak Tengah Hilir. Aneesh Anandadas collected GPS positions and notes on land use both inside and outside the plots.

The second re-measuring by the professional foresters took place in Keluin on 1-4 December 2013 and in Benuak Tengah Hilir on 5-7 December 2013.



Figure 4. Forest inventory training for local people. (Photo by M. Poulsen)

4.6. Geospatial Methods

The first part of the spatial research included collection of available maps and other descriptive site information from different sources. The village locations were compiled into GIS based shape file formats and Google Earth based KML file formats. Maps available from other research or project groups working in Kapuas Hulu were compiled, and spatial editing and modifications were applied if required. All the datasets were brought into a common geographical reference system. All the available GPS locations from the earlier field trips of the project were collected and used to facilitate initial counterchecking of land cover and other geospatial details in GIS.

Further, the preliminary identification of remote sensing data for the study sites in Indonesia, Vietnam and Lao PDR was conducted, using Landsat 30m and RapidEye 5m image tiles. Landsat data of Kapuas Hulu for 2009 and 2013 were downloaded to check land cover conditions and the feasibility of using these data.

To support the analysis, a literature review was started and is currently on-going in order to combine information on: (a) Swidden Landscapes (b) Remote Sensing and GIS approaches used for analysing dynamics of swidden agriculture (temporal and spatial changes in the land-scape); (c) Carbon pools and models in swidden systems.

Further, an initial GPS survey on the existing land-use types in Kapuas Hulu was conducted in order to identify the existing land use types in the study area. Especially, to better understand how to identify different stages of fallows (typical to swidden agriculture) using remote sensing data. For the purpose of obtaining appropriate satellite data, the geographical area of influence of the study villages was assessed spatially. Following steps were followed: 1) the different land use classes in the study village were discussed together with the local community members (key informants) and among the field team (including the carbon team lead by M. Poulsen); (2) GPS data was collected from all the identified land-use classes together with the local community members (as an initial sample), and information on the characteristics of the plots were discussed, observed and noted (observations by the field team, land cover class descriptions given by the local communities, land cover classification as perceived by the field team). The GPS data were checked using the high-resolution satellite image and it was stored in geospatial format, and more points were generated in GIS software based on the field sampling, and the feasibility of using the images was checked. Based on this initial land use classification, ten land use classes were identified in total for the four study sites in Kapuas Hulu. The same approach for the initial land use classification has been/will be followed in the other study sites of the project (Vietnam and Lao PDR). In addition, for better understanding of carbon measurements in the field, the participatory carbon measurement team (lead by M. Kjøie Poulsen) was joined to the field in the Keluin and Benuak Tengah Villages. Some training for GPS data collection was also conducted for the local community members and the research team, and a GPS data collection manual was prepared.

5. Description of the study sites

5.1. Final selection and locations of the study sites

Kapuas Hulu was selected because of its large forest area where several REDD+ and PES project had been planned or implemented, although it was not a pilot REDD+ site. Kapuas Hulu was still developing REDD+ and PES implementation approaches, and there were many relevant questions to be studied before such projects could be implemented in an effective, efficient and equitably way.

In Kapuas Hulu district the people had a long-standing tradition of migration and high mobility, moving freely across the border with Malaysia. More recently, cross border movement had been curbed by both governments. Development in terms of better infrastructure, markets and more income opportunities had also changed the migratory patterns as well as land use.

In addition, as mentioned in the section 4.1, another CIFOR partnership project, namely CoLUPSIA, was operating in the area. This project was implemented in the same area as COPULPSIA in order to diminish double work and improve collaboration among these two projects and partners. The CoLUPSIA project members, Yves Laumonier and Shantiko Bayuni advised us to make the initial selection of the study sites based on our criteria and their knowledge of the area.

After visiting all the initially selected four study villages and confirmation of the sites as suitable for our study, we selected one hamlet (dusun) in each village: Keluin (Mensiau Village), Bunut Lalau (Janting Village), Benua Tengah Hilir (Benua Tengah Village), and Sungai Telian (Tinting Seligi Village).

In the Mensiau Village the selected hamlet consisted exclusively of a longhouse, called Keluin. (Table 1), while in Tinting Seligi and Benua Tengah Villages in addition to the longhouse, also households outside the longhouse were part of the hamlet. In Janting Village the selected hamlet Bunut Lalau included several households living inside and outside the longhouse (Table 4.)

Table 4. Location and inhabitants of the selected hamlets in Kapuas Hulu District, West Kalimantan

Hamlet name/ study site	Village name	No HH Hamlet	No HH Inside LH	No HH Outside LH	Doors LH	Sub district name
Keluin	Mensiau	23	23	0	10	Batang Lupar
Bunut Lalau	Janting	96	10	86	10	Badau
Sungai Telian	Tinting Seligi	35	26	9	19	Badau
Benuak Tengah Hilir	Benuak Tengah	49	27	22	39	Putusibau Utara

Sources: 1. Hamlet leader Keluin, 2. Village leader Janting, 3. Village leader Sungai Telian, 4. Hamlet leader Benuak Tengah; LH=Long house

5.2. Description of the Keluin hamlet

The longhouse (hamlet) of Keluin in Mensiau Village was a relatively small longhouse of ten biliks (rooms), inhabited by a total of 23 households. It was located in the upper watershed of Leboyan

River, and bordered to the Betung Kerihun National Park. The longhouse site was located less than thirty minutes' drive from Landjak, the sub-district capital. Despite this proximity, the unpaved road connecting the longhouse site to the main road was limiting access and the site remained quite isolated.

The Dayak Iban people of Keluin were still mainly depending on swiddening for their livelihoods (subsistence). Most of the active swiddens were located along the hilly terrain a bit further away from the longhouse. In fact, to save labour and for easier access, the people of Keluin often rented fields owned by the neighbouring Dayak Embaloh on the land across the river from the long house. As this was low lying land along the river it makes excellent swamp rice plots.

Besides swiddening, the Keluin households also engaged with other income earning activities, such as rubber tapping and trading, hunting bush meat, and off farm work elsewhere, most often in Malaysia. The temporal and permanent migration, especially to Malaysia, was an important source of additional income for the people in Keluin. In addition, the expansion of oil palm plantations at the nearby cities such as Badau, also provided jobs for the Keluin people in the region. The oil palm had not reached the village yet, and although several people worked at oil palm plantations around Badau and Lanjak, in Keluin the traditional way of living was still the norm.

In addition to swiddening, the people of Keluin were also conducting other forest management practices. Around the longhouse, people typically planted different tree species, specifically fruit trees such as durian, rambutan, jackfruit and mango. When the longhouse was abandoned or moved, these '*Tembawai*' remained, and acted as the main sources of non-timber forest products (NTFPs). *Pulau* instead, was an iban word that referred to a protected area mostly for spiritual reasons. Sometimes, however, these forests were not easily accessible (for examples because they were located in the top of the hills), and it could also be that they had been conserved because they were hard to reach. The forests in *pulau*s were similar to natural (primary) forest.

Rubber plantations, as well as jungle rubber, were also an important part of the land use and livelihoods of the Keluin (Iban) people. The rubber in the area was either planted in rubber stands, or between the secondary forests as a jungle rubber. Other main land use practices consisted of several forms of agroforestry systems, vegetable gardens or cassava plantations.



Figure 5. Women of Keluin and CIFOR team member. (Photo by local man)

5.3. Description of the Bunut Lalau hamlet

Bunut Lalau (Janting Village) was located very close to the busy town of Badau (less than half an hour by car/motorcycle). Different than Keluin and the other research sites, Bunut Lalau had a city-like vibrant atmosphere, where most people lived in individual houses, outside the longhouse. Only 10 households were still living in the longhouse.

While other livelihood options, such as working in oil palm plantation or other odd jobs in town, were easily available; swiddening was still an integral part of local livelihood. However, as more labor was now absorbed in other income earning activities, agricultural labor shortage had become inevitable. The time invested for swiddening was decreasing and the collective labor exchange option, locally known as *beduruk*, was not any more freely available. Consequently field sizes had reduced and the traditional pattern of the swiddening cycle was often interrupted. Most people in Bunut Lalau, thus, had much smaller area under swidden practices than before, with a fallow period of about three years, requiring a higher amount of fertilizers and herbicides/pesticides.

In Bunut Lalau, *tembawais* and *pulaus* along with fallows at different stages were also still present. The river water did not look as clear and clean compared to the other study sites, probably partly due to the different soil type in the area (not many rocks, more clay), high population with proximity to a bigger village/town of Badau, but also the key informants mentioned that the river had become dirtier little by little after the oil palm companies had expanded their plantations in the area. The oil palm company started its operation in Janting area in 2009.

5.4. Description of the Sungai Telian hamlet

The hamlet of Sungai Telian, Tinting Seligi Village, could be reached from Badau by provincial road, which was full of potholes or through oil palm plantations (unpaved but in better condition). In 2013, the company was building new roads connecting Badau to Semitaw, known as *jalan CPO* to transport the harvested oil palm to the nearest mill, in Semitaw.

Sungai Telian was part of Tinting Seligi village, a new village, separated from the main village of Kekura in 2007. It was located near Badau sub-district, where the oil palm plantation (a subsidiary of Sinar Mas) was currently expanding.

The longhouse of Sungai Telian had 19 doors occupied by 26 households. Most of the inhabitants were engaged with oil palm companies, mostly working as casual laborers at the plantation, but also as foreman, security guard, truck drivers, and construction laborers. During the fieldwork in 2012-2013, the oil palm plantations in Sungai Telian were just 2-3 years old, and employment had been mainly on establishment and early maintenance of the plantations. However, besides providing job opportunities, the company also provided other benefits such as road construction, free school transportation, free basic medical care, and other subsidies if requested.

Although oil Palm had taken over much of the land and agricultural labor, swiddening was still an important part of the livelihoods of the people. In fact, people specifically mentioned that they preferred several livelihood options over one (e.g. oil palm only) and engaged in a diversity of activities and land use, such as swiddening, collecting forest products (i.e. durians and other fruit trees), rubber tapping, and cultivation of other cash crops such as pepper).



Figure 6. The Village Head of Sungai Telian showing his pepper garden. (Photo by: M. Kallio)

5.5. Description of the Benuak Tengah Hilir hamlet

Benuak Tengah was a relatively new village, established in 2007 and divided in two hamlets, Benuak Tengah Hilir and Benuak Tengah Hulu. While Benuak Tengah Hulu was located near the road and people lived in individual houses, Benuak Tengah Hilir consisted of one long house and only a few individual houses.

The longhouse site was 4 kilometers away from the main road, on the banks of the Apalin River. The Dayak Embaloh people living there traced their history over 25 generations. The longhouse itself was first built in 1864 and had been renovated twice, the first renovation was back in 1940 and the second one was in 2008. The second renovation was supported by the government development fund (PNPM Mandiri), donor money, and the Institute of Dayakologi, who wanted to develop it as a tourist destination. At the time of this study, the longhouse counted 39 rooms and was home to 27 households. One of the rooms was designated as a museum although currently it served as a guestroom.

Similar with the other sites, *tembawais*, other types of secondary forests, *pulaus*, rubber plantations, jungle rubber, agroforestry systems and cassava plantations were part of the land use systems of the local people. One *pulau*, consisting of logged over peat forest, was located on the opposite side of the river from the longhouse. A private timber company used to exploit the timber but had left either because most valuable timber was gone or because the concession rights expired. It was unclear whether this area was all state forest, and the local community claimed the area for hunting, agriculture and a source of construction material.

Traditional subsistence had been based on swiddening, hunting, fishing and collecting forest products (seasonal fruits, etc.), but in the early 2000s, the swidden-based rubber planting (transitional swidden and rubber garden) started to expand as it provided opportunity for the community to earn money. No oil palm expansion had yet taken a place in the area. Migration to

Malaysia or other surrounding cities, especially among the younger generation, was still an option to earn cash outside the subsistence farming activities. Many of the migrants from Benuak Tengah Hilir were working at the oil palm plantation in Badau and/or logging companies/plantations in Miri, Serawak Malaysia.

6. Results and discussion

6.1. Progress of the research

By the end of 2013, the team had finished all the planned fieldwork for the first phase of the ASFCC project. However, a no-cost extension until 31 March 2014 allowed the knowledge sharing workshops, communication, data management, transcription, and translation and data analyses to be continued in the period of January-March 2014. ~~The more detailed data analyses and preparation of the scientific publications will be done between April-December 2014.~~ The second phase of the ASFCC project has also been started in January 2014, but will fully kick-on in April 2014 and continue for 3 years more (until 2016). In the second phase more detailed research will be conducted on food security, migration and carbon stocks in swidden landscape and communities in Kapuas Hulu.

The fieldwork for the phase 1 in Indonesia included 16 Focus Group Discussions (FGD) that were conducted in each of the four study hamlets during the period of November 2012 - January 2013. In each of the four sites FGDs were held separately with women, men, and young people. The data from the FGD has been used for selecting the networks/systems for the detailed household level surveys conducted during September-December 2013. As described in section 4.3, the networks where the local people exchanged resources or information selected for the detailed ego-network surveys included: (a) system on credit and borrowing money; (b) system for obtaining fertilizers and herbicides; (c) and the customary land use system.

The organizational survey was conducted in June-July 2013 and December 2013. Of the original list of 25 organizations, 16 organizations were interviewed including government organizations of different levels, NGOs, private sector and community representatives. This data has been transcribed and translated in October-December 2013, and some of the initial results of this survey can be seen in the following section (6.2) of this report.

The participatory carbon measurements by NORDECO were conducted in the hamlets of Keluin and Benuak Tengah Hilir. The sites were selected based on the scoping trip conducted in November 2013. Stratification according to local land-use categories and with a focus on tree cover was done during the participatory mapping exercise. Community monitoring groups established 141 permanent plots of which 106 had large trees. Trees in these 106 plots have been measured twice by the community monitors (February 2013 and November-December 2013) and twice by professional foresters (April 2013 and December 2013). The data collected during February-April 2013 has been provisionally analyzed. The tentative findings are described in the section (6.2) of this document. In addition, a scientific paper has been published partly based on the results of this project.

The study on land-use and land-use change, and associated carbon stocks was also started in the first phase of the project. Preliminary data, including: maps and reports, were collected from other projects working in the study area; literature review was started on the subject; initial spatial analysis was done; material for further analyses ordered; and initial ground truthing for different land use classes was conducted in Kapuas Hulu. The aim in the second phase of this project is to further look in detail the land use change patterns (and associated carbon stocks), especially the changes in swidden practices (i.e. fallow lengths and areas under swidden practices) in the study

areas. The methods for this study will be further developed using the material collected in the phase 1.

6.2. Preliminary findings

6.2.1 Focus Group Discussions

Identification of the participants

Throughout September 2012 to January 2013, the ASFCC team conducted 12 Focus Group Discussions (FGD) in the villages of Benuak Tengah, Keluin (Mensiau), Bunut Lalau (Janting) and Sungai Telian. In each study site three FGDs were conducted; one for men, one for women, and one for young people (men and women) (Table 5). The purpose of grouping the participants by age and gender was to find out any differences among these groups in perceiving the issues discussed during the FGDs, namely: the main events that had influenced their lives in the past; main current changes in their lives (related to land-use, income sources, migration, other livelihood aspects etc.); and what kind of information and resources were exchanged by the community members, with who; and how the information and resources were exchanged (systems/networks). Further, it was assumed that being grouped by gender and age would help the different groups to discuss more easily among each other, and express themselves more freely.

Table 5. Number of the FDG participants by the study site, age group, and gender.

Study site	Age group (years)	Male	Female
Bunut Lalau	≥25	7	19
	≤25	7	4
Keluin	≥25		
	≤25		
Benuak Tengah	≥25	11	12
	≤25	4	2
Sungai Telian	≥25	28	20
	≤25	17	9
Total			

Source: ASFCC field data

The FGDs participants were identified through consultations involving key informants, such as head of longhouse, customary leader, village leader, hamlet leader, and village/longhouse female and youth representatives. The ASFCC team members first explained about the purpose of the FGDs, what the criteria for participating in each group were (i.e. men, women and young people, and not only the leaders of the village), and the time requirements for the meetings. Based on the consultations, the key informants then invited participants to join the FGDs.

The FGD process

As described in the section (4.2) of this document, during the FGDs information was collected on: the background of the study sites (historical timeline); other livelihood and land-use related information and; the existing information and resource exchange systems or networks in the community and beyond.

The FGDs facilitator started the discussion by briefly introducing the research and its purpose, and then highlighted topics that ought to be discussed in the focus group discussions. Afterwards, the discussion was started with the history of the village/longhouse. The FGD participants could start the discussion from the point in time they preferred, and different preferred starting times for the discussions were thus used for different groups. At each event, the facilitator prompted follow up questions on what kind of changes resulted by the events discussed, and how the different past events affected the wellbeing and life of the community. In addition, the way how information and resources were exchanged related to different events and topics were discussed thoroughly. The facilitator further helped the participants to group the events/topics discussed into different systems/domains (and associated networks), and the participants ranked these systems based on their importance for their livelihoods. In average, the FGDs took 2 – 2.5 hours to conduct.

The field team found it challenging to involve equally the different participants of the FGDs into the discussion. The village leaders and other members with a high social status and confidence often tended to dominate the discussions, even after facilitator's efforts to encourage more equal dialogue. Several of the more dominant key-informants with high social status also possessed more links the local government and/or other influential actors in the area (such as oil palm company), and thus were often more knowledgeable compared to the rest of the population, who received second-hand information from them. Hence for some parts of the discussions such domination became inevitable. Furthermore, the language barriers and difficulty to articulate knowledge/ideas, especially among the elderly, also sometimes prohibited active discussion to take place. While in contrary, although limited knowledge on historical events; youth were able to provide broader information on some issues, such as on: off-farm job opportunities at the oil palm plantations in the surrounding vicinities; Malaysia; information related to education and; rubber trade.

Systems identified during the FGDs

During the FGDs several systems (domains) were identified related to which information and resources were exchanged (networks) (Table 6). Some of the identified systems are described more in detail in this section.

Table 6. The systems identified by the local communities during the Focus Group discussions (by village). The systems identified by the local community which were not included in the analyses as systems (as the definition of the system used in this study was not fulfilled), are shown under the systems that fulfill the predefined criteria. The table also show the ranking of the systems in order or priority for the participant's livelihoods (note that several systems could have similar priority).

Table 6. The systems identified by the local communities during the Focus Group discussions

Systems (men)	Ranking (men)	Systems (women)	Ranking (women)	Systems (young people)	Ranking (young people)
Bunut Lalau					
<i>Systems fulfill the criteria</i>					
Adat	1			Adat	3
Government	1	Government	2	Government	2
Companies (oil palm)	4			Oil Palm Companies	5
Other parties	4	Credit Union	1		
<i>Systems not fulfilling the criteria</i>					
Trade	2	Traders	3	Traders	4
Malaysia	3	Malaysia	3		
Transport	1	Vehicles	1		
Friends		Friends	1	Friends	1
Extended family, kin				Parents	1
Mobile phone	1	Mobile Phone			
		Pak Janting	1		
Benuak Tengah					
<i>Systems fulfill the criteria</i>					
		Government	1	Government	2
Forest and plantation	1				
Swidden and Rubber tapping	1	Rubber and traders	1	Swidden and rubber Tapping	1
Customary (adat), longhouse	1	Longhouse, culture/customary	1	Culture	1
Other parties	2	Riak Bumi and other party	1		
Oil Palm	1			Oil Palm	5
				Credit Union	3
<i>Systems not fulfilling the criteria</i>					
				Migration	4

Systems (men)	Ranking (men)	Systems (women)	Ranking (women)	Systems (young people)	Ranking (young people)
Keluin					
<i>Systems fulfill the criteria</i>					
Government	1	Government	4		
		Traditional labor and agricultural input exchange	5		
		Companies	2		
		Traders	3		
<i>Systems not fulfilling the criteria</i>					
Family	2				
Migration	3			Money from migration	1
Traders	4				
Ruai	1				
Longhouse	2				
Sungai Telian					
<i>Systems fulfill the criteria</i>					
Government	1	Government	2	Government	1
Oil palm company	3	Oil palm company	1	Oil palm company	4
Umai	2	Umai (including tapping rubber)	1	Swidden (ladang)	5
Other income sources (rubber)	2			Other income sources (rubber Pepper, durian)	3
Credit union	4	Credit Union	3	Credit Union	6
Church	3			Church	2
Other parties	5				
<i>Systems not fulfilling the criteria</i>					
		Malaysia	3		

Systems related to agriculture

Under the broad topic of agriculture, the local people identified several systems during the FGDs. This was because most of the activities in these communities were still related to land use, mostly agriculture and different forms of forest management. The traditional, and still dominating land use practice, was swiddening together with several forms of forest management. These land use practices were very important part of the local traditions and culture, and they were mostly governed under the customary (adat) system.

The systems identified by the men, women and young people in the four villages related to agriculture included: (a) adat (customary law) or other traditional issues, “longhouse issues”, as called in one village (urusan rumah betang); (b) swiddening and rubber tapping; (c) trading cash crops, (agricultural or forest products, such as rubber, pepper, durians) and; (d) Oil palm.

Oil palm especially had a high significance in land-use change, especially in Bunut Lalau and Sungai Telian sites. It was, however, separated by the communities from the other land-use systems, which were considered as traditional. Even rubber was considered as part of the traditional way of using land, grouped mostly together with swiddening. The staff of the oil palm company’s also acted as important information sharers for job opportunities; oil palm related issues as well as other topics. Furthermore, a significant number of migrants from other islands of Indonesia (such as East Nusa Tenggara) had moved to the area (close to Sungai Telian and Bunut Lalau) for working in the oil palm plantations. This movement of migrant workers was organized by the oil palm company, and probably had its influence on the land use and information and resource exchange in the area, but this topic would require further research. Migration to Malaysia and other areas also had influenced the land-use practices in the study sites, as described more in detail in section 6.2.3.

The landownership and swidden practices in our studied areas were still regulated by the customary land system (adat). Every year, before the new swidden was opened (June or July), the head of the longhouse (tuai rumah) summoned the longhouse residents to meet at the ruai (the common area in the longhouse) to discuss the swidden locations, and when the land clearing was to be started. At this opportunity, longhouse residents also discussed and coordinated the labor exchange. Families who shared land ownership (lahan kongsi) also discussed among themselves, of how much land was to be opened that year. While, those who were landless also talked to their immediate relatives (who owned land), or the other landowners who had land surplus about possibilities to borrow or rent some land (pinjam tanah). Within this system, the customary leaders were highly involved in managing conflicts/disputes related to boundary or ownership. The dispute resolution system operated within hierarchical order, for example first problems were handled by the lowest rank of customary staff (pengurus adat), if unsolvable by the higher rank (head of hamlet), or finally by the customary leader or head of longhouse if unsolvable otherwise. The highest appeal handled by Tumenggung (chief customary leader in the larger customary area).

All of the systems that were identified by the local communities further included several “sub-systems or networks. One of these was the “fertilizers and herbicides”, or agricultural inputs network, which was then selected as one of the systems studied more in detail in the ego-network study, based on the selection criteria, described in section 4.3.

As describe in section (6.2.3) agricultural inputs had become an important part of the local communities land-use management in many cases, as land was used more permanently, fallow periods were shorter (less fertilizers naturally) and less labor was available for weeding. Information on fertilizers and pesticides was obtained through different avenues. The communities living close to

Malaysian border, often obtained this information from the Lubuk Antu market. This market was the nearest market located close to the Indonesian and Malaysian border (in Malaysian side), and was the place for local people to purchase supplies, such as the agricultural inputs, but also other basic supplies such as sugar or salt. Furthermore, information and resources on agricultural inputs were obtained through friends and extended family members resided around Lubok Antu vicinity. Through these interactions, people were introduced to the use of pesticides, herbicides and its sprayer tank, as well as to fertilizers that were heavily promoted (and subsidized) by Malaysian government. Moreover, the information on agricultural inputs was also obtained through community events such as *beduruk* (collective labor exchange), *gawai* (harvest celebration).

New agricultural technologies and tools were also learnt often through migration experiences. For example as most of the men in the studied area had migrated, and had worked in timber logging companies, construction projects, or oil palm plantation, they also had learnt of several new technologies during these experiences. Chainsaw is among the “new technologies” learned during migration, and was then brought back to the villages. Women in Bunut Lalau, for example, learnt how to use chainsaw from their husbands who used to use it while working in Malaysia at the logging companies.

Government subsidies

There were several government development interventions and subsidies received by the local communities in all four sites. These interventions were mostly related to education and health facilities, infrastructure and agriculture. For example some agricultural inputs, such as seeds, seedling, and fertilizers were received from the government. Also school or health station was built in some sites using government subsidies. These government interventions were identified during the FGDs as a separate system.

One of the most often-cited government interventions was the so-called PNPM Village Development Assistant. Information and resources related to PNPM were mainly received through the official government network, namely district and sub-district government - village leader – hamlet leader - community members. Specifically, the sub-district office informed the village leader about PNPM, who then called for meeting to inform the community members. In this meeting the village committee to handle the administration, treasury, logistics, and project implementation related to PNPM project was selected, and the proposed project discussed. The proposal for the PBPM project was then submitted by the village leader and discussed further with the government authorities.

Besides of the subsidies received from the district level, in Benuak Tengah and Sungai Telian, direct government assistance was received from the provincial government, particularly from the Provincial Agricultural Office (Dinas Perkebunan, Pertanian dan Peternakan) that distributed agricultural inputs (i.e. prime rubber seedlings, pepper seedlings, fruit trees, and teak) and animal husbandry (cattle) assistance. The village community, furthermore, also received social security assistance from the national government, such as conditional cash transfer (Bantuan Tunai Langsung) to compensate for high price of fuel, and for poor health insurance. The village leader and hamlet leader conducted the information sharing about these benefits at the village level, while these leaders got the information directly from the government.

Credit Union and other forms of savings and credit

One of the systems identified during the FGDs was the Credit Union (CU). Most of the community members at our study sites affiliated with one or more of these microfinance institutions (credit

union/CU) that operated in the area, such as Tilung Jaya, Tapangkasih, Pancur Kasih, and Keling Kumang. Such affiliation allowed the members to save money, receive credit, and other benefits, such as health and life insurance.

In our study sites, CU institutions came to the longhouse to meet the representative of the longhouse/village (i.e. head of village, head of longhouse, head of the hamlet) to explain about their program. Subsequently, the village/longhouse representatives invited all community members to meet at the longhouse common room (*ruai*) to listen about Credit Union and participate in the financial education. By the end of the meeting, CU staff recruited community members who wanted to join. Further, the Credit Unions held regular meetings, every once a year in the district capital or other larger towns in the area (Badau and Putusibau), where also village representatives were invited. In addition, CU field staff visited the sites regularly (see section 6.2.3). In addition to Credit Union Institutions, community members especially the rubber farmers also accessed credit from traders, and used harvested rubber sap as collateral for their loan. Also family, relatives and neighbors often provided credit for the people.

Other parties/other organizations operating in the village

In addition to the government, staff of the oil palm companies and traders, also some other parties were mentioned during the FGDs, which also brought some information and resources to the community. Such actors included NGOs (i.e. FFI, Riak Bumi) and international organizations (i.e. CIFOR).

Other systems, communication tools, and social foci

During further discussion on the systems identified by the local people, it was concluded by the research team, that trading and migration were not systems according to the predefined criteria set for this research. They were more like forms of exchanging information (networks, connections), and through them information and resources related to several topics (systems/domains) could be exchanged. For example the traders (actor) and the meetings between the traders and local people (social foci) facilitated the exchange of information and resources on several topics, but was not considered as a topic (system) itself in this research. Similarly, migration acted as a way (network) of gaining information and resources on multiple topics (systems/domains) through experience while migrated or via the exchange of information and resources with the migrated relatives and friends.

In Keluin and Benua Tengah sites, for example, traders who stopped by the village, brought in information related to prices of different commodities (i.e. rubber/ironwood/pepper). In addition, traders also brought in food and non-food supplies (such as clothing, canned fish, salt, sugar, etc.) to the local community that purchased them using the cash earned from rubber trading. Some of the traders also had an established connection with local key persons who then acted as an intermediate with local community members.

Mobile phone, improved infrastructure and motor bikes (transportation) were mentioned during all FGDs as ways or tools that had improved the information and resource exchange, and they were also not counted as systems themselves after discussion within the research team. Mobile phone was used frequently in order to exchange information on prices of different commodities, job opportunities and other important information. Mobile phones also facilitated the communication with family members in Malaysia, children in high schools or university etc. Friends and family were mentioned as very important sources for any kind of information, and for obtaining several

resources. Church was identified to be a system itself, and acted in many ways as a place to meet and exchange information.



Figure 7. Women's focus group discussion in Sungai Telian. (Photo by: C. Maharani)

6.2.2 Ego-network and socio-economic questionnaire

The ego-network and socio-economic study were conducted by using a semi-structural questionnaire that included questions on the following topics: (a) general socio-economic characteristics of the household; (b) education level of the household members; (c) livelihoods/income sources of the household (includes questions on food availability/security); (d) household assets; (e) extension, rural development and social organization of the household (head); (f) migration; (g) ego-networks; (h) REDD+ and PES involvement and; (i) swiddening. In total 124 household heads were interviewed (in few cases the wife was interviewed when the husband was not available), some living in the traditional long house and others outside the longhouse in individual houses (Table 7). At the time of writing this activity report the data of the ego-network and socio-economic study was still under management and analyses. Yet, the final results are not yet presented in this document, but some general points related to the interviews are described in this section.

Table 7. Number of the households interviewed in each study hamlet.

Research Sites	Total Population Size (HH) (identified)			Number of Respondents (HH)		
	Total	LH	Outside LH	Total	LH	Outside LH
Bunut Lalau	96	10	86	42	10	32
Keluin	23	23	0	10	10	0
Sungai Telian	35	26	9	26	19	7

Research Sites	Total Population Size (HH) (identified)			Number of Respondents (HH)		
	Total	LH	Outside LH	Total	LH	Outside LH
Benuak Tengah	49	27	22	46	23	23

LH=Longhouse

Agricultural inputs and off-farm income options

New income earning opportunities have impacted the land use in the four research sites in various ways. For example, working in an oil palm plantation required a new daily routine (with eight hours working day), which had changed the traditional daily routine. In some areas, though, the people worked only half a day and spent the rest of the working day in their own (traditional) fields. Nevertheless time spent on their traditional land use practices had decreased significantly.

Meanwhile the introduction of herbicides and fertilizers had also impacted the land use. With herbicides and fertilizers, the land could be used longer (no need to clear new land) and less labor was required for weeding. Using them thereby released labor for other activities. Involvement in other activities, then in turn, necessitated the use of herbicides and fertilizers in order to maintain an adequate level of productivity.

The need for fertilizers, herbicides or other agricultural inputs further imposed the household for new costs and needs for cash that needed to be earned off farm, for example in the oil palm plantations, or via migration jobs. This was especially the case in Sungai Telian (also with Bunut Lalau), where several households were already working for the oil palm plantations, and had changed large areas of their traditional swidden areas into permanent agricultural plots.

Subsidies given as part of government development programs, sometimes, included herbicides, pesticides and fertilizers. In the study sites it was mentioned (but only ones) that the government provided agricultural inputs along with rubber seeds assistance (Gerhan program). Some community efforts for getting access to these agricultural inputs were also mentioned. For example in the Bunut Lalau and Keluin Hamlets the people had organized themselves as a farmer group to obtain herbicides and fertilizers from the agriculture office. As a requirement for further assistance the community was asked to provide a progress report to the agricultural office. However, due to the lack of capacity for organized reporting in the community, this requirement was not achieved, and no more assistance was received.

Swiddening, traditions and livelihood strategies

Even with the high interest and needs for additional income earning options, in none of the studied hamlets, were people ready to totally abandon their traditional land use practice, swiddening. Swidden agriculture was seen as an essential part of the community's culture, traditions and history, where for example culturally important rice varieties were conserved, and related to which several rituals and events were organized. Swidden agriculture thus was valued as a source for food, but also as a system linking the young people and parents, traditions to home. For example, as part of the conservation effort, even the younger people working in oil palm companies had a small swidden planted for conserving the local rice varieties (*beras Iban*). The Iban, for generation, have believed that local rice variety was considered "sacred", vital and valuable, and that it needed to be preserved for the future generations. People were also used to and preferred to, eat their own local

upland rice varieties, although where possible also established paddy fields. They also preferred diverse livelihoods options rather than being dependent on only one or few.

In fact, most of the households remaining in the village, still cleared land every year for swiddens. In addition, they often tapped rubber for cash. Increased natural rubber prices at the commodity market had also influenced the rubber expansion, and currently some people were converting swidden fields to rubber plantations in the second year or swidden.

Some segregation in the preferences for land use practices and income earning options by age was seen in the study sites. While many of the young men (and some women) were earning wages from oil palm plantations and migrant work, the older people and most of the women of all ages, were mostly working on their swidden lands to grow rice and vegetables to meet the domestic needs.

The swiddens were mainly established in fallows of different ages, such as; from a very young fallow called ora (2-3 years), a bit older fallow called pemuda (3-5 years) or medium aged fallow called pengerang (5-10 years). In most of these fallow types the people needed to clear the land from grasses, ferns or medium size trees, described to be size of a human head or thigh. This size of trees could still be cut manually (with a jigsaw) and the ferns and grasses cleared using herbicides. Only few of the respondents opened old fallows (more than 10 years old) for swiddening, as cutting bigger trees required extensive labor inputs. Due to the migration work in Malaysia or other places of many young people, especially men, the remaining labor available in the study villages were mostly women and elder men. The lack of labor then made it even more difficult to open old fallows for swidden. In addition, most of the old fallows were located far from the longhouse (more than 2 hours round-trip walking), inquiring farmers to allocate more inputs (labor, time and money) for managing these areas, such as the resources and time needed for building huts and travel to the far away location. Also cutting bigger trees required kerosene for the chainsaw. Furthermore, an unpredictable rainy season added to the difficulty to clear up (burn) the residual coming from the bigger trees at the older fallows. Such combination of factors contributed to shorter swidden rotation patterns used by the farmers (i.e. on average 4-5 years currently from previous 7-8 years).

Besides shortening the fallow period, farmers had adopted different strategies to maintain the swidden practices. As an example, for securing the labor availability, people in Benuak Tengah worked on shared swidden plots together with five to seven families (*tanah kongsi*). While in Bunut Lalau and Sungai Telian, farmers reduced the swidden size and cultivated the same swidden plots for two to three years in a row (locally known as *mpalai*). In Keluin, people rented or borrowed land close to the longhouse, which belonged to the neighboring village, because they did not have the resources to clear old, fallows uphill and also, to avoid pests (birds, orang utan, etc.).

Mobility of swidden communities and off-farm income earning options

It is well known that the Dayak people are mobile, and often migrate temporarily or permanently to different areas. The initial results showed, that people were still moving and migrating, but that in some of the study sites there was less movement across the border to Malaysia than some decades ago due to the new job opportunities close to the village (such as in oil palm plantations). Several people even mentioned that they preferred to work close to their home. However, the migration patterns varied between the different study sites, and especially in the sites with only few off-farm income options, migrating to Malaysia played still a significant role for income earning and gaining experience. The main destiny of the Kapuas Hulu people in Malaysia was mentioned to be Serawak. Information on available jobs at logging sites or oil palm plantations was normally shared when

relatives, who worked in Malaysia, returned to their villages during Gawai or Christmas celebration. Beside remittances, they (people who migrated) often brought things to which they were exposed while in Malaysia such as chainsaws, rice mills, fertilizers, and pesticides. For example, people returning from Malaysia brought the first mobile phones in these areas.

Sungai Telian, for example, provided a case where migration did not anymore play as important role in income earning than before because of the job opportunities in the oil palm plantations close to home. But in Keluin and Bunut Lalau migration still played an important role on additional income earning. In these two study sites other income earning options than migration were quite limited, and no significant oil palm plantations had been established.

Other off-farm income earning options also existed. For example in Benuak Tengah Hilir, the community was looking for additional cash from tourism and by reviving traditional cultural activities of the Embaloh people with the aid of the Institut Dayakologi. The community received significant government funding to rebuild the long house, which included an additional room to be used as a museum-art gallery. At the time of this field research, the museum was used as a guest room, and there were even further plans for making another guestroom to the other side of the long house. In addition, toilets had been built to the hamlet using funding from PNPM Mandiri.

Hence, in all the villages people were looking for additional income earning options in different ways, depending on the available options in the area. The people felt that in general life was easier and more cash was available than before, but on the other hand, life had become more expensive. Especially the young people required new, modern services and products that were expensive, such as Internet and mobile phones.

The access to better road, and proximity to Malaysia and larger urban or semi-urban areas, had also a strong influence on the life style of the local communities. Bunut Lalau and Sungai Telian were already almost as small towns, while Keluin and Benuak Tengah still remained more traditional and remote. The improved road access allowed people to open swiddens along the road; instead of along the water stream. Planting near the road reduced the travel time and maximized the remaining working hours. In Bunut Lalau and Sungai Telian (with more new off-farm income options), the land use decision-making had also become more individualized. The land-use decision-making was still more communal in Benuak Tengah and Keluin (with less off-farm income options).

Swidden systems and environmental services

The swidden of the Iban people in the study sites typically followed the several stages: (1) *Umai*, recently opened agricultural land, used to cultivate rice and vegetables; (2); *Damun*, a former *umai*, younger than 10 years old, typically used for planting rubber or let to grow naturally with different species; (3) *Pengerang*, fallow older than 10 years up to 25 years; and (4) *Pengerang tua*, fallow more than 25 years old which usually included different types of fruit trees and hard wood. Furthermore, the Dayak Iban communities in the study sites also recognized *pulau*: forest consciously reserved or protected. These areas were not allowed to be logged or cleared for agriculture but could be used to satisfy personal needs. In addition, there were *tembawais* in the study area, areas where a long house used to stand previously. As people had planted fruit trees around the house, these *tembawais* became sources of fruit for the community.

In spite of the general negative image (in many cases, but not all) of swiddening among governments and even conservationists, Dayak Iban swidden systems seemed to contain a high diversity of crops,

and traditionally incorporated conservation efforts. As the Iban people moved to a new swidden location, they put the previously planted land to rest and preserved it for several years before they came back. Often they also planted or enhanced the growth of different tree species, including rubber, to enrich the new growth. Sometimes in the young fallows also agricultural crops were planted. These fallows (and other forest areas managed by the people) then often provided many products and services for the people: places to collect forest products for food, medicine, construction material, and material for baskets and mattresses; environmental services, such as hunting areas, biodiversity, insect pollination, climate regulation, flood control, soil protection and carbon sequestration. Even the study sites were bordering, inside or at close proximity to the national park (Betung Kerihun or Danau Sentarum National Park), yet the people did not seem to think the National park was that important. No advantages (i.e. environmental services) or disadvantages caused by the park were mentioned during our interviews and communications with the local people. Further focus will be put to study the environmental services and products provided by the fallows and other forest management systems of the swidden communities in the second phase of the ASFCC project.

Ego-networks

For the ego-network study three systems (or embedded networks) from the FGDs were selected (based on the predefined criteria) for more detailed study on resource and information exchange in the swidden agriculture communities (please see section 3.4 for more details). These systems were namely: (1) Fertilizers and herbicides; (2) Credit and loaning system and; (3) Customary land use system. At the time of writing this report the network data had not been analyzed yet, thus this report does not include the analyses on the information and resources exchange in the communities, or on the potential implications of these networks for REDD+. Yet, some description on the two (out of the three) studied systems in Benuak Tengah Hilir site are provided below.

(1) Fertilizers and herbicides in Benuak Tengah Hilir (as an example)

In regards to information and resources exchange on pesticides and herbicides in the Hamlet of Benuak Tengah Hilir, Toko Matahari was nominated most often to be an important information sharer. Toko Matahari was the nearest shop for the people in Benuak Tengah hilir providing agricultural supplies, such as seed, fertilizers, pesticides and tools. It was located in the district capital (Putusibau), approximately one-hour trip from the Benuak Tengah Hilir longhouse. Although visits to Toko Matahari were not very frequent, once to twice a month at the most, still most of the respondents seemed to access the shop in order to acquire price information of pesticides and herbicides, and in order to purchase them. At this shop, respondents also sought other information such as appropriate fertilizers for paddy and/or rubber, and how to use them (mixing composition).

The longhouse residents, who were originally from outside Benuak Tengah, were also mentioned as important information agents for the local community, as they had previous knowledge on the usage of pesticides and herbicides that they had learnt in their native villages. Because of their hands-on experience, many villagers came and asked their recommendation on pesticides/fertilizers and on how to use and mix pesticides. In addition, en-route traders were also considered as important information and resources bringers. Because of their connections with markets outside Benuak Tengah, respondents considered them as knowledgeable, and thus, often inquired information from them related to the prices (for fertilizers/herbicides) and on which brand should they use. Also, they occasionally requested traders to bring herbicides and fertilizers when they came to the village.

The longhouse residents who joined in rubber farmers association (*kelompok petani karet*) also received some fertilizers and rubber seeds from the District Forestry Office (Disbunhut). The District Forestry Office had also initiated some efforts to provide training on trainers (ToT) on rubber garden management. The training was targeted to the rubber farmer group representatives, but so far only two people had received this training. Beside of this training, there were no other transfers of information to the members of the rubber farmer association by the government. The extension worker had only visited the farmer group located near the main road, but had not yet visited the farmer group located in the longhouse (where this study was conducted), because of the longer distance to the longhouse. Instead of the visit to the longhouse, the extension worker had sent messages to the longhouse through the village leader, and subsequently asked him to help control the longhouse farmer group. But for one reason and another, it never happened and the longhouse farmer group was no longer active.

(2) Credit and loan system in Benuak Tengah Hilir (as an example)

More than half of the respondents in Benuak Tengah Hilir accessed information and resources related to credit and loan opportunities through Credit Union (CU) membership. The rest of the respondents acquired such information and resources mainly from family members/extended family, rubber traders or shop owners. Few households seemed to have no connections to any of the credit or loan related sources/networks.

Accessing information and resources on loan and credit through CU had become more viable with the monthly visits of the CU field staff at the longhouse of Benuak Tengah Hilir. During this monthly visit, CU field staff introduced their products, recruited new members, received new credit applications, collected fees, savings, and credit instalments, as well as recorded and monitored the saving and credit balance. Even though the CU visits were frequent, because of the high staff rotation, it was often difficult for the respondents to refer to certain name with whom they had been in contact while acquiring information on credit and loan. Half of the CU members in Benuak Tengah Hilir had family relation to CU field officers, though, when obviously the name of the family member was mentioned. Some advantages of the CU were perceived to be a relatively low interest rate (compared to a bank) and the life and health insurances that were provided by the CU for their members.

In order to become a credit union member, a client had to pay one-time membership fee of IDR 500.000, monthly membership fee of IDR 20.000 (for administration), and monthly savings and/or credit instalment. Most respondents who became credit union members had also other sources of income in addition to subsistence swidden, either from rubber or migrant work/remittances, allowing them to afford the membership requirements. The respondents, who were not involved in CU, were often women-headed households (age 50-70 years) who were supporting their grandchildren (age 4-15 years), while their parents were migrated elsewhere. As these women mainly relied on subsistence swiddening, with no own rubber groves as additional source of income, they had no or little cash to afford the monetary requirements for CU. They often also mentioned that they had not received any remittances from the household members that had migrated.

Despite CU, other avenues to acquire information and resources on loan and credits were rather informal, such as through kinships and rubber traders. For those who owned rubber groves, they could use rubber (latex) as collateral to get loan from rubber traders. In regards to this informal credit and loan system somewhat limited data could be collected, as many of the respondents were reluctant to inform us about their debts (taboo).

6.2.4 Organizational survey

During the organizational surveys in Kapuas Hulu area in total 16 organizations of different types were interviewed (Table 8). The data from the organizational surveys was not been analyzed at the time of writing this report. Some initial points, however, are presented in this section.

Table 8. Organizations interviewed in the Kapuas Hulu District (by organization type).

Organization type	Province level organization	District level organization	Sub-District level organization
Government	0	4	2
NGO	5	2	1
International donor	0	2	0
Private sector	0	0	0
Total	5	8	3

As Kapuas Hulu still have almost 80% of forest cover, most of the respondents of the organizational survey did not consider deforestation as an issue. After further probing they admitted that forest cover is decreasing and that forests are being degraded because of past logging, current expansion of oil palm and mining. All respondents considered swiddening as a minor driver of deforestation and forest degradation, as the clearing of forestland for swiddening purposes was comparatively small to some other land uses, and most of the cleared forest would recover within a few years. Oil palm was planted largely in APL (*Area Penggunaan Lahan* or outside the state forest area), but gold mining (a few large scale with permits and many illegal small scale) occurred in forest area, mostly in the southern part of the district. Some respondents mentioned that the underlying cause of deforestation and forest degradation was the weak governance and fragmented land use planning, whereby land use planning is hampered by lack of data and absence of a coordinated grand land use plan ('grand design'). Two respondents also mentioned that deforestation was caused by government policy. After all, the national government (Ministry of Forestry, MoF) had issued the logging permits, which led to deforestation.

Stances on REDD+ still need to be analyzed but in general there was a clear difference between government respondents and the others. Several of the government respondents said that there was too much talk, not enough information and no money. They felt that studies to measure carbon were confusing for the local people and raised expectation. One of the government actors stated: 'Show first evidence that a certain volume of carbon is worth a certain amount, show us the money, and then we will tell you how much carbon there is'

The data showed that most discussions on REDD+ were initiated by FFI (Flora and Fauna International) and GIZ (*Deutsche Gesellschaft für Internationale Zusammenarbeit*). These international organizations appeared to be more engaged in REDD+, while the government agencies were not interested in REDD+. Indeed one respondent from a government agency explicitly stated he had no interest in REDD+.

In regards to information exchange on forest issues, FFI and the district forestry agency (*Dinas Kehutanan*) were nominated most often to be important information sharers. Most respondents seemed to have their own specific networks on information exchange whereby the sub-districts appeared to be very isolated. Sub-districts could not mention others, with whom they exchanged information related to REDD+, and they collaborated mainly with the District Forestry Agency, even though, one sub-district representative said there was also collaboration with WWF (World Wildlife Fund).

Government agencies repeated the complaint that Kapuas Hulu did not benefit from having so much protected area. However, NGOs working on conservation and community development mentioned that they received funds through CORDAID (Catholic Organization for Relief and Development Aid), Ford Foundation, US Fish and Wildlife, USAID (The United States Agency for International Development), FAO (Food and Agriculture Organization), ITTO (The International Tropical Timber Organization), EU (European Union), WWF, GIZ, and Samdhana (Southeast Asian Environmental NGO). Funding streams to NGOs appeared to be completely separate from the funding that the government agencies received. The only funding that was received directly by the government was through the KfW GIZ-Forclime Project. These funds however, were disbursed through MoF and some agencies were not aware that the funds were project funds because Kapuas Hulu had so much forest.

Most NGOs were engaged in community development efforts through community forestry as well as quality improvement and marketing of honey. The larger internationally connected NGOs such as WWF and FFI were engaged in larger scale ecosystem restoration, spatial planning and eco-tourism efforts. GIZ and WWF were also focusing on establishment of an operational forest management unit.

The most common social foci for exchanging information and resources by the different actors in Kapuas Hulu district were:

- The annual Danau Sentarum festival initiated by RIAK Bumi, but now also involving many other NGO and government stakeholders
- The FORUM DAS (watershed forum)
- Forum MIKE (Melayu, Iban, Kantuk and Embaloh interethnic forum)
- RPHK (Relawan Pemantau Hutan-Volunteers for forest monitoring)
- JPIK (Jaringan Pemantau Independen Kehutanan- Network of Independent Forestry Monitors)
- Forum for Village Forests
- Ruai TV (a TV broadcasting station run by local people on local issue)

6.2.5 Study on participatory carbon measurements

The participatory carbon measurement part of the project can show:

- IPCC Good Practice Guidance based community carbon inventory methods can be adjusted to swidden landscapes.
- Swidden communities can identify different land-use types in a landscape mosaic and recognize these in the field.
- These land-uses types, identified by community members, can be used for stratifying for carbon monitoring.
- Marginalized swidden community members can measure trees in dynamic mosaic landscapes with results very similar to the professionals. This has been shown by ASFCC for the first time.

- The swidden community monitors can re-locate plots within the area used for swiddening by eye-sight and without maps or GPS.
- Nevertheless, if community carbon monitoring in swidden landscapes is to be accurate, remote sensing will be needed to tell the area of each land-use type.

The preliminary analysis show that swidden communities and foresters agree well on which land-use types hold how much carbon in the living trees (see Fig. x).

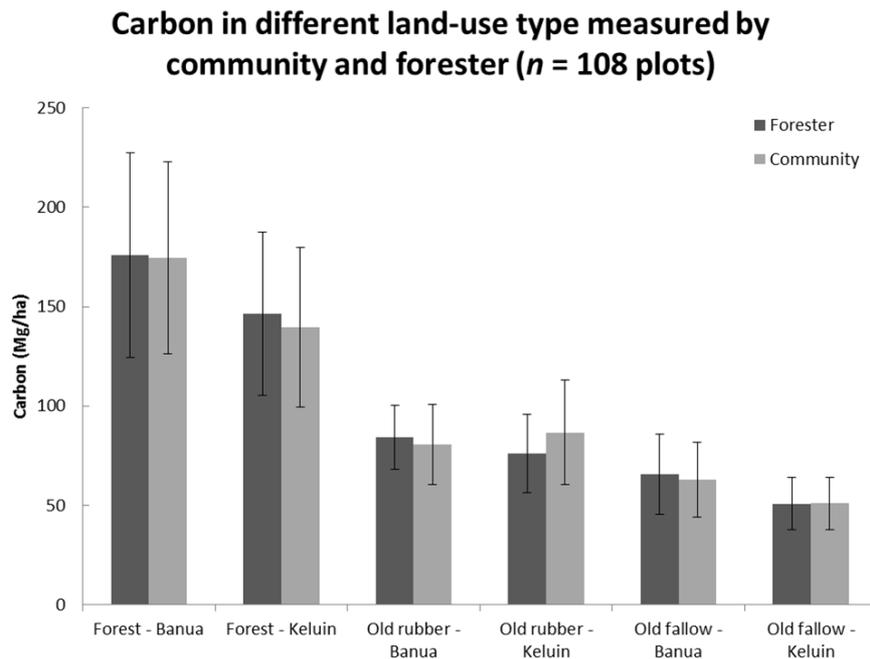


Figure 8. Carbon estimates in different land-use types by foresters and community monitors.

6.2.6 Study on spatial approach on swidden landscape

Using the spatial approach described in the section 4.6, and after discussions with the field team and village people the following land cover / land use classes were identified.

1. Reserved Forest
2. Fallow-mature
3. Fallow-young
4. Fallow-bush
5. Swidden-pure [rice, corn and vegetables]
6. Swidden-mixed [rice, corn and rubber]
7. Rubber-developed
8. Palm oil
9. Road and new settlements / built up / quarrying
10. Water / water logged

The study villages included Sungai Telian, Janting, Keluin and Benuak Tengah Hilir in Kapuas Hulu District, West Kalimantan.

In addition to the initial land cover classification, more specific land-use classes were developed based on the interactive discussions with key informants and the research team. Information

provided by local communities helped to derive from the general classification schemes available from different sources to more detailed and specific scheme (Table 9). The land cover classification presented in the table 9 will be further modified (during the phase 2 of ASFCC) by systematic land cover verification in the field.

Table 9. Initial land cover stratification based on initial data and information from local key informants.

1.Reserved Forest	Conserved forest with mature trees (similar to natural forest). Most of the area in this category is recorded in official documents. It also Includes reserved areas by the communities with a dense vegetation cover.
2.Fallow-Mature	Mature secondary forest (regrowth), previously used as swidden.
3.Fallow-Young	Young secondary forest (regrowth), previously used as swidden. Some ground shrubs along with the young trees.
4.Fallow-Bush	Bush land fallow, immediately after the swidden. Some bushy vegetation and small trees.
5.Swidden-traditional	Swidden cultivated with rice, corn or vegetables after the slash and burn process.
6.Swidden-rubber	Swidden cultivated with rice with some rubber seedlings planted along with it.
7.Rubber-developed	Mature rubber plots
8.Oil palm	Monoculture oil palm plantations
9.Built up /Road/ Quarrying	Road, new settlements, quarrying activities, or built up activities
10.Water	Water logged areas and water bodies including rivers

GPS Points representing the 10 land use/land cover classes were collected in the four study sites. Already established forest inventory plots by the carbon team (M. Poulsen et al.) were available in the study sites of Keluin and Benuak Tengah Hilir, The land use / land cover stratification followed by the team of M. Poulsen was compared with the land use strata derived from GPS survey. The stratification used by M. Poulsen’s team for land uses and forest types was more related to the size of the trees than the age of the fallow, and is described in the table 10.

Table 10. The land use stratification used by the carbon team (M. Poulsen et al.) as compared to the stratification identified during the GIS scoping trip.

Land use strata – field plot	Definition by field plot establishment	Definition of the GPS team
Ladang	Rice fields	Rice fields
Damun	Abandoned Ladang before trees are growing. Often mostly with ferns and noted as Damun/Resam	Bush fallow
Pengerang Muda	Fallow with trees of girth \leq 50cm.	Young fallow
Pengerang	Sometime used for areas with trees just reaching a girth of 50cm.	Young fallow

Land use strata – field plot	Definition by field plot establishment	Definition of the GPS team
Pengerang Tua	Fallow with largest trees with girth between 50cm and 100cm. Areas where there never have been Ladang, but where trees are of this size.	Mature fallow
Pulau (in Keluin)	Any forest with trees with girth \geq 100cm.	Forest
Hutan (in Banau Tengah Hilir)	Hutan Rawa (swamp forest) which formerly have experienced selective logging and now have trees with girth \geq 100cm.	Forest
Kebun Karet Muda	Not explained but apparently with rubber trees not yet used for producing rubber.	Fallow (with rubber)
Kebun Karet Tua	Not explained but apparently with rubber trees producing rubber. Tembawang (forest garden) is included in this stratum	Fallow (with active rubber) or rubber plantation well managed

With the use of high-resolution satellite data in swidden landscape it was possible to visualize the swidden patterns and other land use classes identified in the field (Figure 9).

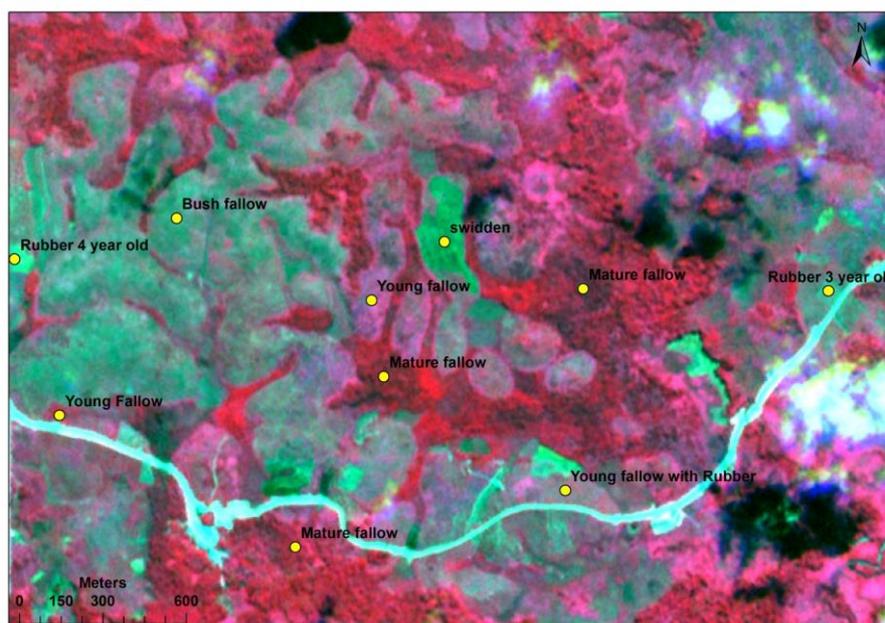


Figure 9. Land use in Janting. (Source: RapidEye satellite)

The main challenge in deriving the land cover / land use information by comparing satellite image with ground reality GPS points was that the definitions on the ground for different land cover and land uses varied with local communities. More precisely, the consistency of information match between actual ground and satellite image is controlled by local definitions also. The same land cover patch signature may contrast in definitions at different local communities. So the accuracy can be improved with the addition of local definitions with spatial reference. Some data mismatch due to the satellite image collection date was found and it needs to be solved with the latest date image acquisitions.

7. Conclusion

During 2012-2013 the ASFCC project has made a significant effort to collect quality data in Kapuas Hulu District, West Kalimantan, Indonesia. The fieldwork for the phase 1 in Indonesia included 16 Focus Group Discussions (FGD) that were conducted in each of the four study hamlets during the period of November 2012 - January 2013. In each of the four sites FGDs were held separately with women, men, and young people. The data from the FGD was used for selecting the networks/systems for the detailed household level surveys conducted during September-December 2013. The networks where the local people exchanged resources or information selected for the detailed ego-network surveys included: (a) system on credit and borrowing money; (b) system for obtaining fertilizers and herbicides; (c) and the customary land use system.

The organizational surveys were conducted in June-July 2013 and December 2013. Of the original list of 25 organizations, 16 organizations were interviewed including government organizations of different levels, NGOs, private sector and community representatives. This data has been transcribed and translated in October-December 2013, and some of the initial results of this survey are described in this document.

The participatory carbon measurements by NORDECO were conducted in the hamlets of Keluin and Benuak Tengah Hilir. The sites were selected based on the scoping trip conducted in November 2013. Stratification according to local land-use categories and with a focus on tree cover was done during the participatory mapping exercise. Community monitoring groups established 141 permanent plots of which 106 had large trees. Trees in these 106 plots have been measured twice by the community monitors (February 2013 and November-December 2013) and twice by professional foresters (April 2013 and December 2013). The data collected during February-April 2013 has been provisionally analyzed. The tentative findings are described in the section (6.2) of this document. In addition, a scientific paper has been published partly based on the results of this project.

The study on land-use and land-use change, and associated carbon stocks was also started in the first phase of the project. Preliminary data, including: maps and reports, were collected from other projects working in the study area; literature review was started on the subject; initial spatial analyze was done; material for further analyses ordered; and initial ground truthing for different land use classes was conducted in Kapuas Hulu. The aim in the second phase of this project is to further look in detail the land use change patterns (and associated carbon stocks), especially the changes in swidden practices (i.e. fallow lengths and areas under swidden practices) in the study areas. The methods for this study will be further developed using the material collected in the phase 1.

The data management and analyses is still underway for most research components at the time of writing this report, and the final results of the research will be available in 2014.

Some conclusions, however, can be made based on the initial results. People in the study locations valued the possibility for diverse sources for food and income, and thus combined subsistence sector with the new job opportunities driven by the commercial sectors. There had been changes in swidden practices, rotation lengths, and plot sizes driven by factors such as: the introduction of fertilizers and herbicides; alternative options for livelihoods (including migration) and; improved road access. Presumably more and more labor will be absorbed (and lured by incentives offered) by

the palm oil or other growing commercial sectors. This change could be seen at the sites already, and will further have a major influence on the deforestation and forest degradation in the area, and thus on the associated carbon stocks, biodiversity, food production and quality of the life of the local people. On the other hand several REDD+ and PES projects had been initiated in Kapuas Hulu which could potentially provide new livelihood options and alternatives for more sustainable use of the natural resources.

The research results of the ASFCC Phase 1 will contribute on the knowledge related to how potential REDD+ or other programs, with the aim to improve local livelihoods and diminish deforestation and forest degradation, could be implemented more effectively, efficiently and equitable way. Both poverty alleviation and decreasing deforestation and forest degradation are in a high importance in Indonesian development program.

The Phase 2 of the ASFCC project will continue working and further strengthen the knowledge on these issues in Kapuas Hulu. Especially it will focus on detailed research on food security, migration and carbon stocks in swidden landscape and communities, all important aspects for successful implementation of a REDD+ or other PES projects.

8. ASFCC Phase 2 and next steps

Until March 2014 the ASFCC Phase 1 ~~analyses and writing~~ will be finalised, and the ASFCC Phase 2 will be started. Main partners will be approached, methods developed, literature reviews conducted, and field research started.