

Appendix 3: I-REDD+ WP5 Country Report: Laos

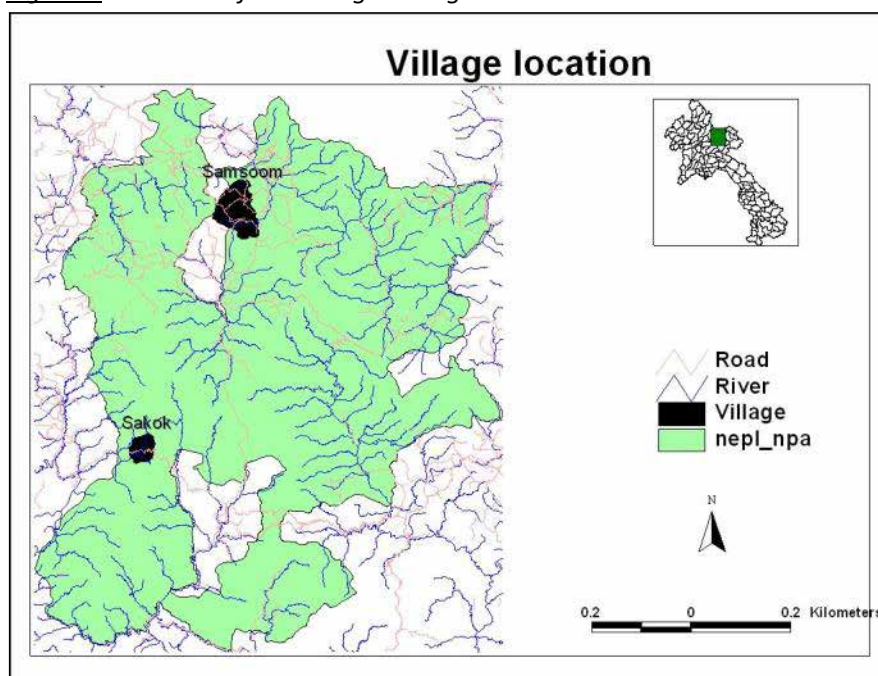
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1. Village description in the regional context

1.1. Village location

Sakok village is located in the core-zone of the Nam Et-Phou Loey National Protected Area (NPA), while Samsoom village is located in the control use zone of the northern part of the NPA (Figure 1). The villages belong to Viengthong District of Houaphan Province in north-eastern Laos.

Figure 1: Location of WP5 target villages in relation with the Nam Et-Phou Loey National Protected Area.



1.2. Characteristics of the village compared to the other villages in the region

Background information on Samsoom village

Samsoom village is a Khmu village which was originally located on the top of a mountain called “Samsoom”. Because of security reasons and health problem, Samsoom villager successively moved from their original settlement area to different locations, which are located at lower elevation than their original village location. The current location is the seventh settlement in the village history. In 2005, villagers moved at the foothill close to Nam Et river following the recommendations of the district authorities to relocate closer to the road with easy access to public services.

Since the creation of the village, the population has never been stable. People moved around for security reason and to find suitable locations for upland rice cultivation. Some families came from and moved to Huangmeuang district of the same province (Huaphan), while some other moved to other villages in Viengthong district.

The most recent population movement were recorded during our field investigations Table 1. According to demographic data of the village, the population growth rate is the double of the national population growth rate, which are 6.4 and 3.2 respectively.

Table 1: Population trends in Samsoom Village

Year	Household	Population	Female	Births	Deaths	Immigration	Migration
2012	71	368	187	2	0	0	0
2011		360		6	0	0	2
2010		353		8	1	0	0
2009	47	347	176	7	1	0	0
2008		338		11	2	0	0
2007		327		12	1	0	0
2006		323		5	1	0	0

Source: I-REDD+ field data collection, 2012.

Although Samsoom villager resettled seven times, their production areas remained the same. Only the village settlement was moved. However, the cropping intensifies varied according to the distance to the settlement. As a result, the land use systems in Samsoom have not changed much in the recent years. However, since they are currently located closer to road, villagers have better accessibility to market and opportunities for income generation. In 2007, they began to cultivate hybrid maize to replace opium cultivation. The production of cash crops was promoted by the government as part of a policy on eradication of opium cultivation.

Villagers in Samsoom have shortened their fallow period since the boundary of the Nam Et-Phou Loey NPA has been enforced in 2005. Previously they practices 12 – 15 years rotation of their swidden rice depending on household labour. To date, their upland rice fallow is approximately 7 – 8 years depending on number of swidden plots held by household. Villagers in Samsoom conduct their upland rice in the same large area that they open collectively for cultivation every year. The cultivation area is divided into individual plots based on land held by each household through traditional tenure system and labour available for each household a given year. If some families do not own land in the production area that is cleared a given year for swidden cultivation, they negotiate with other families to borrow land for their swidden. For example, a family who doesn't have land in current swidden field borrows land from relatives: *"I hold only four plots of swidden land, which are about one hectare each. This is because my father was an opium addict, he did not manage to secure land for the next generations. Today, I have to negotiate with my relatives to borrow their land for upland rice cultivation. Fortunately, every year some relatives allow me to borrow their land in the place selected by the village to cultivate upland rice field. However, I am afraid that I will face greater difficulty in the near future when population in this village increases. Almost the whole village land is now allocated to individual families"*. The lives of local people who rely on upland rice cultivation only will be

more difficult in the future because of population increase, as the land suitable for upland rice has remained stable or even decreased as compared to 10 years ago.

Since local people moved from their former village, they abandoned some of their former upland fields that are now located half day walk distance to their village settlement. Local people would like to build a road to their former village location which is quite flat and suitable for paddy rice terraces.

The socio-economic status of Samsoom village is currently better than when villagers lived in their former settlement. This is because they now have better access to public services such as school, sanitation, road and market. Though there are largely dependent on natural resources for their household consumption, they can generate cash income from agricultural production, especially hybrid maize. Non-timber forest products (NTFPs) have gradually decreased in the recent years because of unsustainable collection since the village opening to market economy. Besides, the NPA limits access of local villagers to forest resources (e.g. NTFP collection, hunting). Since the national protected area and village boundaries have been clearly demarcated, local people keep their upland field in specific areas. The agricultural production fields (including fallow) are demarcated and forest has been divided into three different management types, i.e. conservation forest, utilization forest (production forest), and watershed protection forest. Village protected and conservation forests are the densest forest among the 3 village forest types. Local people still use resources from village protection forest, but not for logging as it is supposed to protect water sources, both quality and quantity, for the village. Two categories of grassland are distinguished: *Imperata cylindrica* fields where grass is used for house roofing and natural grassland for livestock grazing.

Background information on Sakok Village

The village was created by lao lum (lowland lao or Lao Lum) people in 1978 after the asphalt road was built by Chinese workers in 1977-1978. Before villagers lived in Nameuang, a flat area with paddy fields is now located inside the NPA. They lived in Nameuang for many years since the French colonial period. At that time there were about 60 households in the village, all of them were lowlander (Lao Lum). The first Sakok villagers who moved from the former village in Nameuang used the Chinese camp as their temporal resettlement before their built new houses.

The initial name of the village was Koksa because there is a big Sa tree in this village. The local legend says that the village name changed to Sakok because of a khmu elder who was fishing in the stream close to the road when three men from Luang Prabang came to the village and asked him '*Grandfather, where do you live?*'. The elder man was very scared to answer as there was a lot of insecurity in the area at that time due to counter-revolutionary movements. The old man responded '*I am living in Sakok village*'. Then he ran away because he was afraid those men would kill him.

In 1988, almost all families left the village and moved to Oudomxay and Vientiane provinces because of the insecurity in the area due to fights between government forces and counter revolutionary movements. In 1992, 15 households came back from Donekhoun village of Viengthong district (Huaphan province). Only 3 households from the former village moved back to Sakok. In 1998-1999, soldiers moved to the village to secure the area.

In 1992, 36 households practiced mainly shifting cultivation. They did not have any equipment and experiences to grow paddy rice. Although local people practiced only upland rice field, they could produce enough rice for their household consumption. This is because they had enough land for upland rice

cultivation for every household, coupled with availability of fertile soil in the area due to the presence of dense forest. The 2 first years they grew swidden rice on 10 to 15 years fallows that had been left over by previous villagers. Yields were quite high and labour productivity of swidden was much higher than for paddy fields.

However, since the demarcation of Nam Et-Phou Loey NPA and Land and Forestland Allocation (LFA) in 2000, villagers have to limit their upland rice field into the allocated areas with maximum 7-8 plots per household depending on household size and labour availability. Currently most villager in Sakok practice a 3 year rotation of their upland rice fields, because large parts of their former swidden areas have been converted to hybrid maize cultivation since 2009.

Most of the current village population migrated recently (15 years) from villages and districts such as from Viengthong, Viengkham (Luangprabang) and Vientiane province. Sakok population is now dominated by the Khmu ethnic group with 54 Khmu households and only 5 Lao Lum households. The population has been quite stable since the land allocation has been implemented in the village (Table 2). As the village is located in the core-zone of the park, restrictions have been imposed on immigration.

Table 2: Population trends in Sakok Village.

Year	Household	Population	Female	Births	Deaths	Immigration	Migration
2011	59	321		9	0	2 daughters in law	0
2010		310		5	0	5 (teacher family) + 2 daughters in law	0
2009	52	300	148				

Source: I-REDD+ field data collection, 2012.

Hybrid maize is a booming cash crop in this region. Many middlemen contract villagers to produce maize. Those middlemen provide hybrid maize seeds to local villages as credit, which local people return when they sale their maize production to the contracted middlemen. In Sakok village, villagers contracted with a middleman from Viengthong district in 2009. The village chief signed on behalf of the villagers then submitted the contract to the district authorities to sign as third party or witness. The price of hybrid maize production stated on the contract is based on the average market price. Unfortunately, the price of hybrid maize dropped from 800 LAK² per kilogram in 2009 to 500 LAK in 2010, then villagers refused to produce maize in 2010. They cultivated maize again since 2011, which they sold in early 2012 with the price 1,000 LAK per kilogram. As part of the contract, the middleman built two roads (1 km in 2010 and 3 km in 2011) to maize areas, which indebted villagers for five years. Because of the improved road accesses to the areas, which eased the burden of harvest transportation, many households converted their swidden areas to hybrid maize cultivation. Households who have less land cultivate many crops into the same plot, for example they cultivate rice the first year and hybrid maize the second year. Some households cultivate traditional maize and tobacco mixed with their upland rice for self-consumption, while some other have large field of traditional maize (1 or 2 hectares) to feed pigs.

² Exchange rate on June 2012: 1USD = 8,000 LAK.

Since local people in Sakok have relocated in this village they started growing paddy rice again. 20 households out of 59 do not have paddy field. Those families settled in the village later than the others and paddy rice fields were already occupied. Also, some young families did not inherit paddy fields from their parents. Though other 39 households hold paddy field, 34 out of them are still practicing swidden. This is because the rice production from their paddy rice field is not sufficiency to cover their household consumption. Only five households are not involve in the upland rice cultivation, three households raise livestock and collect NTFPs to buy additional rice, while the other two household can produce enough rice for their household consumption from their paddy fields. This year villager in Sakok increased their paddy area of about 10 hectares. The maize middleman provides paddy field terracing services with price 350,000 LAK per hour of excavator/bulldozer if paid in cash and 400,000 LAK per hour paid my credit. Villagers can reimbursement their credit in maize.

Similar to Samsom village, people in Sakok village generate most of their cash income from livestock, hybrid maize and NTFP collection. NTFPs are usually collected from fallow, production forest and protection forest. These NTFPs sold include broom grass, cardamom, bamboo shoot, galangal and so on. A few households generate additional income from off-farm activities such as house construction, small scale trade but the total off-farm income represent less than 4% of the cash income generated by the whole village .

Since Sakok is located in the core-zone of Nam Et-Phou Loey NPA, some villagers are involved in forest conservation activities such as patrolling and awareness raising. Many people in the village involve in patrolling activities, which they have to stay overnight at the outpost close to the village.

1.3. Land use trajectories and drivers

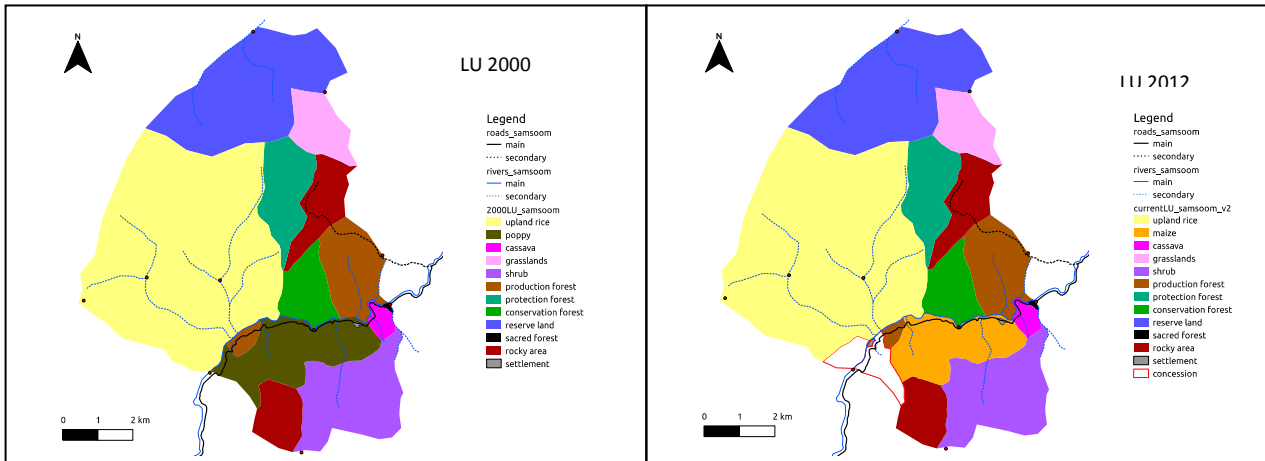
Land use changes in our two target villages depended to a large extent on their relative accessibility. People in Samsom village mainly rely only on upland rice cultivation for their livelihoods. They were still practicing opium poppy cultivation in 2000 as their main source of cash income. People in Sakok are practicing both upland swidden and paddy. They have been under high pressure from the district authorities and NPA management to reduce swidden cultivation and to convert more land to paddy. Hybrid maize provided a new income generation opportunity that was further invested in terracing new paddy fields.

Since the Nam Et-Phou Loey NPA has been demarcated, local people access to forest resources has been restrained, to a larger extent in Sakok, close to the park headquarters and more loosely in Samsom due to the distance that explains a relatively lower administrative pressure.

However, in both villages, local people have shortened their swidden fallow from 10-15 years to 7-8 years. Swidden intensification process is delayed in Samsom as compared to Sakok but it follows the same pattern. In Sakok, land scarcity after land allocation leads farmers to cultivate the same upland area for two or three consecutive years depending on soil fertility. With only 3 years rotation, this means that the fallow is gradually disappearing. In Samsom the swidden area of 2012 has already been cropped two years and they continue with a third cropping year. While the rotation is still officially 7 years, this intensification looks like a prelude to a shortening of the fallow period towards a gradual demise of swidden agriculture like in Sakok. This trend has been actively promoted by the Lao government in an attempt to convert subsistence based agriculture to commercial agriculture. The rapid expansion of hybrid maize in the study area is consistent with the government policy to gradually segregate agriculture and forest on the map and

only for household livelihoods. In 2007 hybrid maize was introduced in Samsoom by a middleman from Viengthong district. Since then, hybrid maize cultivation has expanded in former opium cultivation area, while other land uses remained stable (Figure 2).

Figure 2: Participatory land use maps in Samsoom Village in 2000 (left) and 2012 (right).

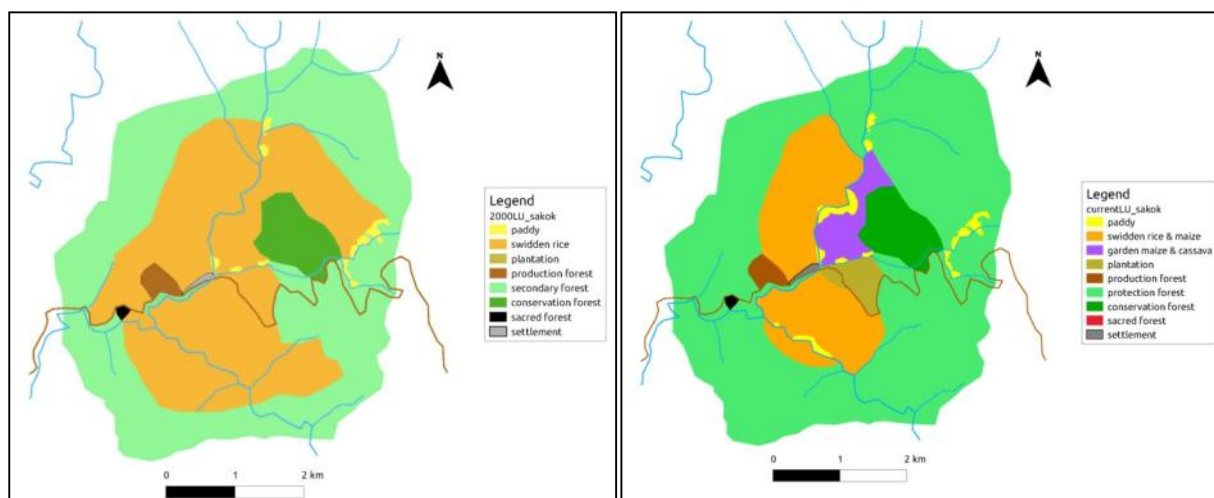


Unlike in Samsoom, land uses in Sakok village changed a lot over the past decade (Figure 3). The land allocation program implemented in 2000 considerably reduced the agricultural land area used by each household so as to increase forest protection in the core-zone of the NPA. Farmers could not expand their fields due to restrictions imposed by the NEPL-NPA and household land endowment was reduced at each generation. This led to a shortening of the swidden rotation cycle from 10 years to 3 years, which is not enough to maintain rice productivity. For those households who do not have paddy land (20 HH), this policy had a strong negative impact on their livelihoods. Such increase in poverty rates after land allocation as been reported in many other villages in the region.

In 2009, people in Sakok began to convert some of their swidden to hybrid maize cultivation areas. Maize cultivation allowed them to intensify their swidden system with one year cropping and two years fallows. Households who owned less than 3 plots started growing maize on their plot the year after upland rice and then maize every year as upland rice could not be grown anymore in the absence of fallow. Since the rotation is getting shorter, local people have to spend more time and for weeding. They weed their upland rice field three times a year. Overwhelmed by weed problems, farmers start using herbicides.

Increased production costs in turn increase their economic vulnerability while land degradation due to increased erosion in upland cropping systems without fallow increases their ecological vulnerability. To reduce the economic risks, some household diversify their production by growing traditional maize and tobacco into the hybrid maize cultivation areas. The traditional maize is used for household consumption and for feeding pig, while tobacco is for sale.

Figure 3: Participatory land use maps in Sakok Village in 2000 (left) and 2012 (right).



2. Profitability of land use systems

2.1. List and description of land use types

Paddy: Paddy usually includes irrigated paddy and rainfed paddy. However, paddy in our target village is only rain-fed, i.e. local people build traditional small irrigation systems to get additional water from small streams during the wet season.

Upland rice rotational field: areas used for upland rice cultivation including cultivated areas and fallows. Current rotation ranged from three to seven years in the study areas.

Maize rotational field: areas served for hybrid maize cultivation. Current rotation period for hybrid maize cultivation ranges from two to four years depending on numbers of plots or parcels that each household own.

From the five types of forest officially recognized in the 1996 forestry law: 1) conservation forest (pa sangouan) 2) protection forest (pa pongkanh), 3) production forest (pa phalit), 4) degraded forest (pa seuam som), and 5) rehabilitated forest (pa feun fou), only the three first types were still present in the 2007 forestry law. The two last types, which corresponded to the broad definition of ‘secondary’, ‘unstocked’, or ‘degraded’ forests have been removed from the official categories as they were prone to replacement by tree plantations. Specific land tenure rules are also associated to each forest class: conservation and protection forest are ‘state land’ while ‘production forests’ can be either ‘state land’ or ‘communal-village land’. Tree plantations can be privately owned. The tenure status of degraded forest has not been clearly defined, certainly because they are supposed to disappear in the long term.

The 2007 forestry law defines the three main types of forest as follows:

Conservation forests are forests classified for the purposes of conserving nature, preserving plant and animal species, forest ecosystems and other valuable sites of natural, historical, cultural, tourism, environmental, educational and scientific research experiments. Conservation Forest consists of National Conservation Forest areas and Conservation Forest areas at the Provincial, District and Village levels which are described in the specific regulation.

Protection Forests are forests classified for the function of protecting water resources, river banks, road sides, preventing soil erosion, protecting soil quality, strategic areas for national defense, protection from natural disasters, environmental protection and so on.

According to local people in our study site, they are allowed to access protection forest for NTFPs collection and hunting by using traditional tools for hunting such crab and so on, but they are not allowed for logging and conversion to other land uses.

Production Forests are natural forests and planted forests classified for the utilization purposes of areas for production, and wood and forest product businesses to satisfy the requirements of national socio-economic development and people's living.

Production forest is also called "*utilization forest*" by local people, because they have free access to this forest type for NTFP collection, hunting, collecting firewood, wood for fencing or house building. However, local village have to submit their logging proposals to village's chief for approval (if the required timber is not more than five cubic meters). The chief of village will have to submit the proposal for timber logging to district level refer to District Agriculture and Forestry Office.

The land use classification in our certain target villages is shown in Table 3. These land use classes were defined by local villagers themselves during focus group discussions.

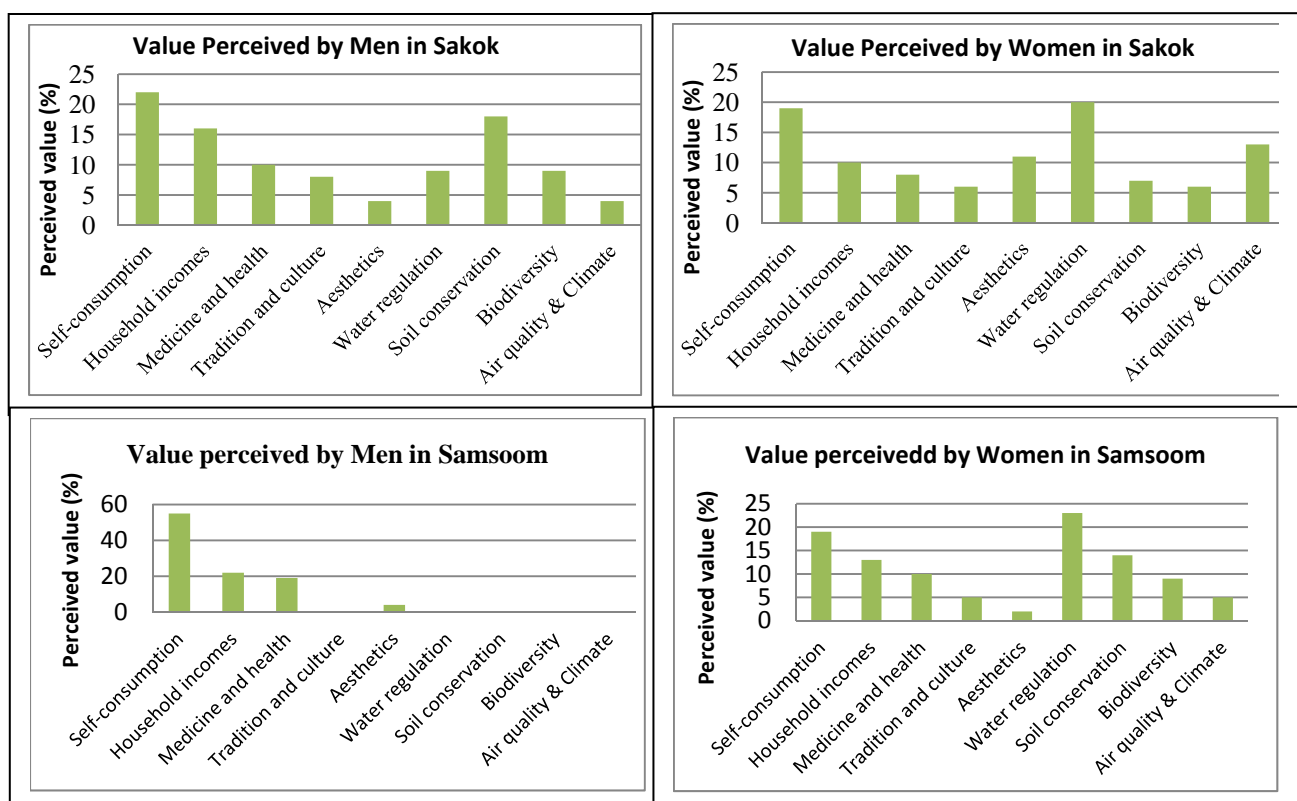
Table 3: Land use categories in Sakok and Samsom villages in 2012.

Sakok	Samsom
1. <i>Paddy</i>	1. <i>Upland rice rotational field</i>
2. <i>Upland rice rotational field</i>	2. <i>Maize rotational field (+ cassava)</i>
3. <i>Maize rotational field (+ cassava)</i>	3. <i>Grassland</i>
4. <i>Sacred forest</i>	4. <i>Sacred forest</i>
5. <i>Conservation forest</i>	5. <i>Conservation forest</i>
6. <i>Protection forest</i>	6. <i>Protection forest</i>
7. <i>Production forest</i>	7. <i>Production forest</i>
8. <i>Tree plantation</i>	8. <i>Reserve land</i>

Perceived value of the different land use types for village households was assessed through a pebble game. In both study villages separate men and women focus groups were organized to investigate the perceived importance of the main land use types for local livelihood (i.e. self-consumption, household incomes, medicine and health, tradition and culture, aesthetics) and ecosystem services (i.e. water regulation, soil conservation, biodiversity, air-quality and climate).

As expected in region dominated by subsistence agriculture, local people were more concerned by rice sufficiency than cash income generation or other services such as medicinal plants or aesthetic dimensions. Men groups in both villages gave values for household incomes higher than those values given by women group. In Sakok, men were highly concerned by erosion and land degradation, while women gave higher value to water regulation service provided by forest cover. Women groups in both villages are concerned by water sources and quality as they are traditionally responsible for collecting water for household consumption and use, while men are concerned by declines in agricultural productivity in relation to land degradation. Local people gave very low perceived values for climate quality and biodiversity as these concepts are very abstract to them. For example they did not see the link between land use changes and climate change (Figure 4).

Figure 4: Perceived values of land use types by local people in Sakok and Samsom Villages,



2.2. Opportunity costs of land use

We used economic parameters (table 4) for assessing the profitability of the different land uses in our target villages.

Table 4: Economic parameters

Price data	2011
Exchange rate	LAK 8,000 = 1 USD
Wage rate	25,000 LAK in Sakok, 23,000 LAK in Samsom or 3 USD/man.day
Discount rate	5%
Timeframe	30-years

The net present value (NPV) was calculated for all land use types. All NPVs are positive and return to labor values are higher than the actual wage rate in the study area (Table 5).

Table 5. Net Present Value and return to labor of land uses in Sakok and Samsom villages

Land use	Net Present Value (USD/ha)		Return to labor (USD/man.day)	
	<i>Sakok</i>	<i>Samsom</i>	<i>Sakok</i>	<i>Samsom</i>
Village				
Paddy rice	3015	-	3.9	-
Upland rice	638	556	3.8	3.6
Maize	706	941	4.3	4.0
Cassava	-	282	-	3.9
Production forest	240	256	6.3	3.8

As expected, paddy is the most profitable land use followed by maize, upland rice and cassava. This result is consistent with the perceived values assigned to the different land use types by local villagers during focus group discussions. The return to labour of the different land use systems are relatively similar with higher value for maize. This explains why maize expansion is related to the extension of 'maize roads' on the hillsides. Mechanization of the transportation of a heavy maize harvest from field to farm is increasing a lot the return to labour for this land use type. The return to labour for swidden rice has decreased in the recent years with the shortening of the fallow period shifting the interest of traditional shifting cultivators towards paddy fields. The area under paddy has increased tremendously in Sakok village in the recent years (e.g. 10 more ha terraced in 2011) and Samsom villagers expressed their interest in terracing paddy fields close to their former settlement if they can build a road to reach that site more easily, that is avoid walking half day to reach the site which would reduce the productivity gain of producing paddy rice.

Cassava represents the less profitable and efficient land use in both study villages. Villagers continue producing marginally to feed the pigs for household consumption and as safety net in case of rice shortage (in Samsom especially).

Production forests present low economic performances in term of NPV from NTFP collection but fairly high return to labour, especially in Sakok village which is close to the national protected area and therefore enjoy better quality forests.

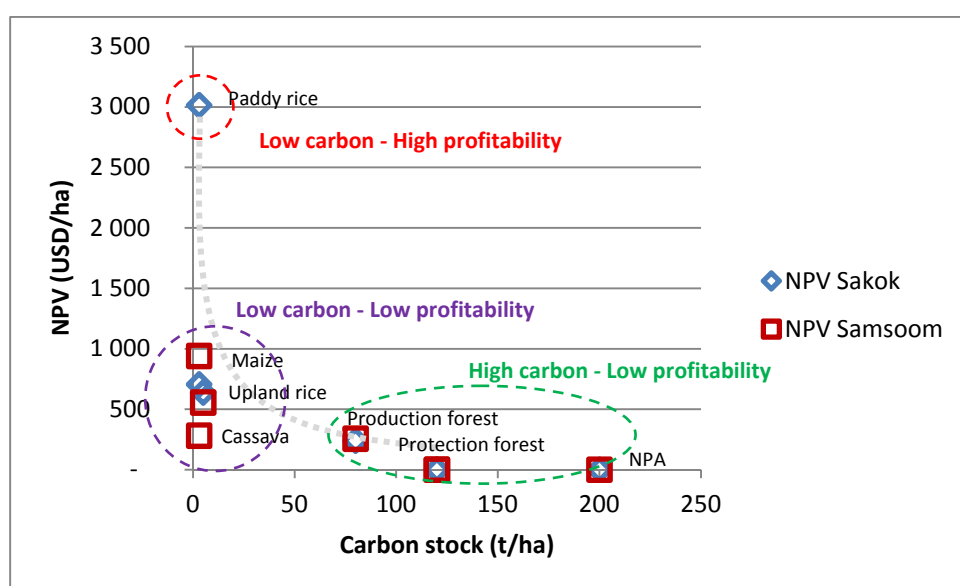
2.3. Trade-off curves of different land-use systems

Time-averaged carbon stocks for the different land uses were estimated on the basis of the literature available and carbon estimations used by a GIZ project for their REDD+ feasibility study in the target area as indicated in table 6 (CliPAD Project, 2012). As shown by the trade-offs curve below (Figure 5), most existing land use systems in the study villages fall into “low carbon stock-high profitability” and “low carbon stock-low profitability” clusters. Protection forests (and to a lower extent production forest) are included in a “high carbon stock-low profitability” cluster. In these conditions, supporting the reconstitution of biomass and carbon stocks in production forests and protecting larger tracks of forest represent attractive REDD+ policy priorities. In Sakok protected forests have certainly attained their limits as land use is already largely constrained by the presence of the national protected area. The only room for maneuver would be enrichment of production forests. In Samsoom village there is certainly sufficient land available to expand the forest area under protection under a REDD+ project.

Table 6. Time averaged carbon stocks (above ground only) of land uses in Sakok and Samsoom villages

Land use	Carbon stock (ton/ha)
Paddy rice	3
Upland rice	5
Maize	3
Cassava	3
Village production forest	80
Village protection forest	120
Village conservation forest	120
National Protected Area	200

Figure 5. Trade-offs curve and clusters of land use systems in Sakok and Samsoom villages



3. Livelihood typology and reliance on the different land use types

3.1. Farming system and livelihoods options

Based on focus group discussions and individual household data collected through survey, village households were classified into 4 main types (Table 7) based on criteria set agreed by the villagers. Main criteria for household classification are:

- **Housing index.** This criterion aims to assess the housing conditions of local people. Permanent houses usually have walls made of concrete or wood and roofed with metal plaques or tiles. Temporary houses have wood or bamboo walls and roofed with straw or bamboo. Access to electricity is another indicator of housing quality. In our target villages electricity can be generated by water turbines using energy from streams or solar panel whenever a specific project has equipped some households. Connection to the electricity grid is planned for the end of 2012 in Sakok and 2014 in Samsom.
- **Economic status.** Total household incomes from different sources, including products for self consumption (LAK/household/year), and household assets in monetary value (LAK/household).
- **Land.** Land ownership is an important indicator of wealth in the area as subsistence agriculture is highly dependent on the land available in relation with labour force that defines household capacity to crop the land so that enough rice is produced to fulfil the family needs (land tenure and food security).
- **Livestock husbandry.** Raising large livestock (buffaloes and cattle) is considered as an important aspect of household differentiation. Livestock plays the role of living savings. Animals are sold for large investments (e.g. house building) and to cover costs of special events (e.g. birth, death, wedding).

Table 7: Household Topology in Sakok and Samsom Villages

Type	Total land (ha/hh)	Total annual income (LAK/hh/year)	Total value of assets (LAK/hh)	Housing index (from 1 to 3)	Large livestock (head/hh)	Description
A	< 1	<1 mil.	<1 mil.	<1,50	<3	Poor
B	1 - 2	1 – 5 mil.	1 – 5 mil.	1,50 – 2,00	3 - 5	Middle
C	>2 - 3	>5 – 10 mil.	>5 – 10 mil.	>2,00 – 2,50	6 - 10	Well-off
D	>3	>10 mil.	>10 mil.	>2,50	>10	Most well-off

Sakok Village

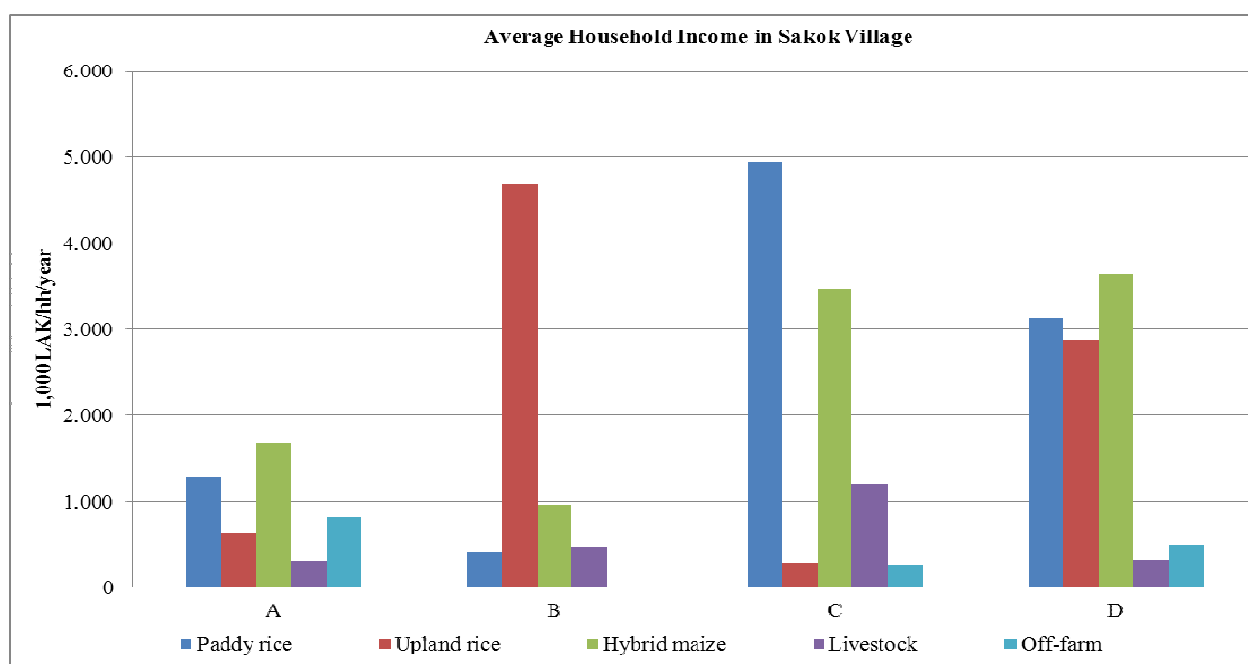
Most households in the village are involved in swidden rice cultivation. Only five households have stopped practicing swidden cultivation. They buy rice to complement their paddy rice production so that they can cover their rice needs. Households usually sell livestock, collect NTFPs and work off-farm to generate cash income for purchasing additional rice to cover their household rice consumption.

According to local people during our group discussion, young households (new comers are not allowed in the core-zone of the NPA) will not have agricultural land for rice cultivation if they do not receive from their parents or relatives. Families that rely on swidden rice cultivation are expected to face greater difficulties in

the future due to land scarcity. Since local people in Sakok village have limited agricultural land, they try to compensate by raising large livestock such as buffaloes and cattle that roam freely in the swidden fallows and surrounding forests. There is no specific land delineated for livestock grazing and local people expect that livestock roaming will be restricted in the future which will require major changes in their livestock raising practices. Improved pasture systems and cut-and-carry foraging systems have been tested by the NPA staff in the area to avoid roaming domestic animals to penetrate the dense forests of the NPA.

Results from household survey indicate that income from off-farm activities of the poorest households (type A) is higher than income from the same source of other household types within the village (Figure 6). Lack of land, often due to recent installation (young couple with little paddy land given by their parents) is the main constraint and there is little prospect for these households that they can acquire new land as access to land is highly restricted in the core zone of the park. Maize cultivation provides additional income on intensively cropped upland fields. Type B are typical shifting cultivators relying primarily on upland rice cultivation for their livelihood. These households do not have much labour force left to enlarge their maize area or diversity productions. Type C are the lowlanders who concentrate on paddy rice production. As the production is not sufficient to cover their rice needs, these households traditionally practices shifting cultivation. But with the shortening fallow periods the labour demand for weeding is too high and competing with paddy rice calendar. These households have gradually turned their swidden field from rice to hybrid maize production. Type D households combined all income generating activities. Historically, these early settlers got access to the largest and most productive paddy fields so that they could cover they rice needs thanks to additional upland rice cultivation. The surpluses were invested hybrid maize cultivation and then diversify towards ff-farm activities such as trading or services (e.g. transportation with truck owned by the household) and livestock husbandry. The kind of off-farm activities that Type A and D farmers are practicing are therefore very different. Type A households are daily wage earners while Type D households are small investors.

Figure 6: Sources of household incomes of people in Sakok Village

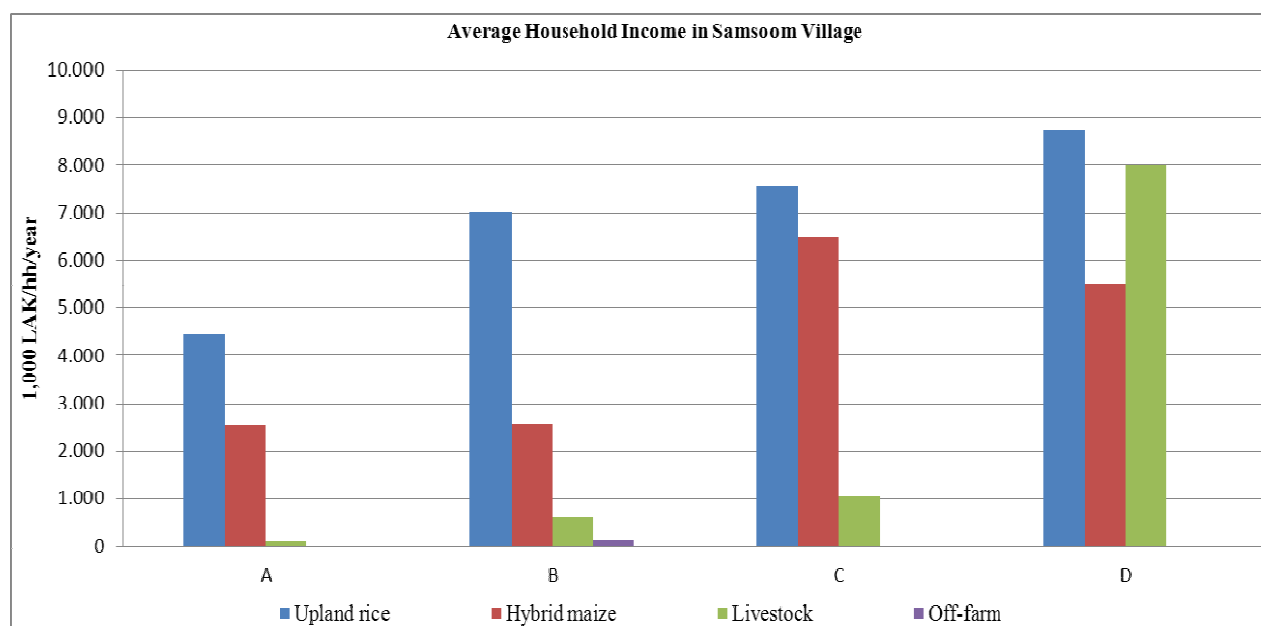


Samsoom Village

The swidden system is managed collectively. The village agricultural land dedicated to swidden is divided into 7 large fields where all households cultivate together a given year. In principle, each household own one plot in each of the 7 fields that are cropped successively. Every year, representatives from all households meet to decide which field they will open this year or if they will crop the same field as the previous year in the case soil fertility would be still high. Then, the whole community goes to the selected field to negotiate the location and size of individual plots for each household. Most household crop again the plot they had cropped 7 years before but in case they would have less labour force than before or more mouths to feed the area can be adjusted and negotiated with other households. The whole community stays in the field until a general agreement is reached (sometimes more than one day). The village leader plays a key role in the negotiation. He supposed to accommodate the needs of all families and satisfy all households. This traditional swidden management relies on collective land tenure and mutual help. It also help spreading the risks of damage from climatic incidents or pests over larger areas (i.e. avoid destruction of single isolated plots in the case of individually managed swidden).

Local people in Samsoom village do not usually fence their swidden fields nor maize cultivation areas because they raise their livestock (buffaloes and cattle) in specific grassland areas. They manage to bring their livestock far from the field which is cropped a given year. The main grazing area is located close to their former Samsoom settlement, about half day walk from the current village settlement. To avoid leaving their animal roam freely, local people have organized a fixed schedule for each household to look after the village livestock herd. Once a month, each household has to send someone to tend the animals. As many households still have temporary houses in their former village, they also raise small livestock such as pig and poultry at the same location. They raise only small numbers of pig and poultry close to the village for their daily consumption or in case they would need money urgently.

Beside swidden rice cultivation livestock raising is the main livelihood option for households in group “D” or well-off households in Samsoom village (Figure 7). The household type gain annual income from livestock about 8,000,000 LAK per household. On the other hand, the poorest household gain little incomes from livestock (about 100,000 LAK/household/year). This is because the poorest households are mostly new couples who do not have enough labour for diversify activities. Since local people in Sasoom rely on upland swidden rice cultivation, all household types in the village consider that upland rice is an important option for their livelihood. Similar to upland rice, all household types in Samsoom village gain their household cash income hybrid maize production. Unlike in Sakok village, aside well-off households in Samsoom not involve in off-farm activities as they spend much labour for livestock raising beside upland rice and hybrid maize cultivation.

Figure 7: Sources of household incomes of people in Sakok Village

3.2. Landholdings

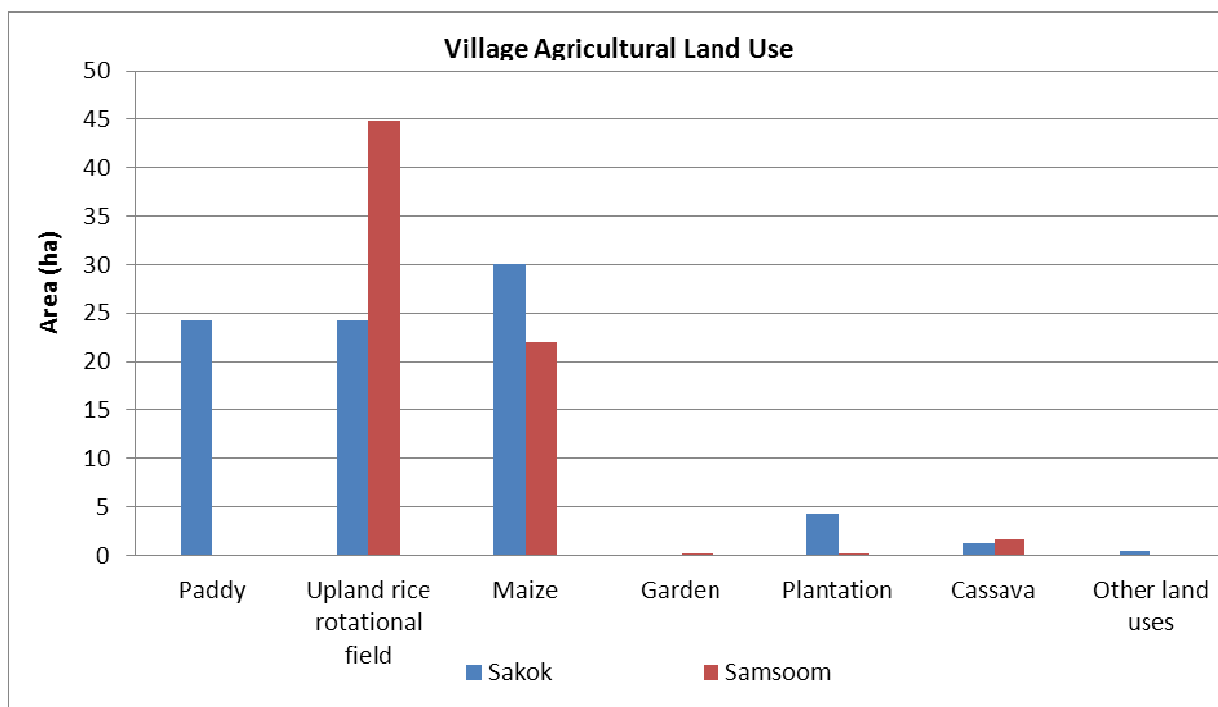
Referring to our household survey data, agricultural land use in Sakok is larger than those in Samsoom village (Table 8). This is because there are more households in Sakok than in Samsoom and local people in Sakok village hold also paddy rice field, while there is not paddy rice field in Samsoom village. Since local people in Samsoom do not have paddy rice fields, they have almost double swidden rice area compared to Sakok village. On the other hand, area cropped with hybrid maize in Sakok is larger than in Samsoom village (Figure 8). Land scarcity and better market accessibility in Sakok lead local people in more intensive cropping system, which they get higher return on land.

Table 8: Land tenure in Sakok and Samsoom Village

Land tenure	Sakok	Samsoom
Total (ha)	136	124

Source: Household survey, 2011.

Figure 8: Land tenure by agricultural land use type, in Sakok and Samsoom Villages



3.3. Poverty and equity

We used the gini index to assess income inequalities in the two target villages. Gini coefficient ranges from 0 (equal income distribution) to 1 (total concentration of income). The Gini index is 0.52 in Sakok and 0.56 in Samsoom.



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Opportunity costs associated with land use transitions

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