Indigenous agroforestry practices in two districts in the northern part of Lao PDR

By Houmchitsavath Sodarak1, Chanhpeng Ditsaphon1, Vienghad Thammavong1, Nonggnao Ounthammasith1 and Olle Forshed2

1 Northern Agriculture and Forestry Research Centre
2 Lao-Swedish Upland Agriculture and Forestry Research Programme

Introduction

In the north of Lao PDR people live close to the nature and their main activity is growing rice. Shifting cultivation is the dominating practice and upland rice is the dominating crop on the sloping hills. Paddy field practices are also to some extent common if there is available land for that activity. Also other crops then rice is cultivated in the upland farming land, such as corn, Job’s tear and a wide range of vegetables. These crops are often integrated in the traditional rice shifting cultivation practice or grown more intensively close to rivers where the land is often more fertile. The shifting cultivation practice in Lao PDR has been widely described in literature; see e.g. Roder (2001) and Sodarak (1998), and today we know quite a lot of how it is practiced. Shifting cultivation could be seen as an agroforestry practice since it is, if carried out in a good way with long fallows, a combination of agriculture and forestry. Side by side with the shifting cultivation practice also other agroforestry practices has been carried out for decades. That could be just some few treatments in the natural forest to get a wanted product (see e.g. Ankarfjard 1998) or it could also be highly advanced systems where trees, animals and plants grow together so that they can make benefit of each other. These systems are not so widely described in literature, either internationally or nationally. The range these practices or systems hold is very little known by a wider audience than the actual farmers in the villages. To know more what the farmers traditionally practice and what techniques and plants etc that has been adopted from projects and outsiders are both important factors to understand when further developing the rural upland agricultural and forestry activities. This study which aims to find out more about ongoing agroforestry practices in two districts is hopefully a step on the track to find out more sustainable and acceptable practices for farmers in these areas.

Objective

To find out and document more about indigenous agroforestry practices in northern Laos so that good ideas and practices could be shared to other farmers to increase their livelihood.

Specific objectives:

- Make a survey in form of interviews and observations of ongoing agroforestry practices in two districts in northern Lao PDR.

- Describe and document the findings.
Definitions
With indigenous agroforestry practices we mean firstly with indigenous that the practice should in one way been developed or adopted by the farmers themselves. We don’t want to include practices or systems that are invented, implemented and run by e.g. projects but if them in a second phase are adopted by farmers completely or partly they have been included. The reason for that is that it is very difficult to separate truly indigenous practices from partly indigenous practices. For examples a specie or technique introduced by outsiders can have been adopted and transformed into a daily practice and is then accepted by the farmer in his practice. We mean with indigenous practices, practices that are firstly truly indigenous and secondly adopted and accepted introduced practices. So, as long as the farmer use and practice the system himself without any help it has been included.

With agroforestry practices we mean practices that include the forest in combination with any agricultural use. We also include practices or systems where woody vegetation and plants are making use of each other or growing together, like e.g. intercropping system with trees.

Materials and methods
This study was carried out in two districts in the upland of the northern Lao PDR, Namo District and Ponxai District (see figure 1). These two districts are seemed as among the poorest in northern Laos and they are also the two target research districts for the Lao-Swedish Upland Agriculture and Forestry Research Programme (LSUAFRP) (Anon 2001a).

Figure 1; Map over inventoried districts, Ponxai and Namo
The method of finding the practices has mainly been interviews with farmers and with follow-up observations in field. This study was based upon Raintree’s and Overgoor’s method of finding indigenous agroforestry practices (Anon. 2001b). For the fieldwork a group of five people were used. The group consisted of two persons educated in agronomy two in forestry and one in livestock, to make a team which could deal with all aspects of agroforestry. The study was carried out in two steps as follows (see also figure 2):

Step 1:
District Agricultural and Forestry Officials (DAFO) were first consulted if they know any agroforestry systems or practices practiced in the district. They were also asked to name persons or villages which could maybe be interesting to visit concerning agroforestry. After discussions with DAFO mentioned villages and persons were visited for more interviews and observations. Since the survey staff also has been working in the districts they also knew some farmers and villages which practiced different systems that was also consulted. Persons in the districts which were known for knowing about things like this, for example old village men, chiefs etc were also consulted. The places were visited very briefly and no deeper interviews were carried out. In this first step the objective was to locate interesting places and farmers for deeper studies. After the fieldwork of the first step lists were done to grade interesting findings that could be visited again. Step one took 13 field working days to finish plus some days in office to finalize the list.

Step 2:
The list from step 1 was followed and interesting places were visited. This time deeper interviews were carried out. Field forms were prepared before which were followed. But, also more “improvised” questions were asked during the session with the farmer to be able to adapt to the special practice he/she carried out. What we wanted to find out were mainly: how did they do the practice, how did they find out this system, the age of the practice, why were they doing it like this, what was the main factors or red threads in the system, what kind of plants were used, production, animals involved, farmers knowledge of sustainability of the practice and how important economically for the farmer were the products from the system.

Figure 2; Schematic flow map over the steps in the survey
Results

Inventory results
During the inventory twenty villages were covered. Most of them were located relatively close to roads. Villages that were far away from roads have not been covered. The inventory was carried out during the summer period of 2004. Overall it took around two months to do the field studies with 28 field working days. To exactly know how many farmers that we met and discussed with is difficult to say but at least 150 farmers were consulted in any form. For more facts about the inventory result see table 1.

Table 1; Days spent, persons met and villages visited during field work.

<table>
<thead>
<tr>
<th>Persons consulted (except farmers)</th>
<th>Step 1</th>
<th>Step 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Villages visited</td>
<td>20</td>
<td>10</td>
</tr>
<tr>
<td>Farmers consulted</td>
<td>20</td>
<td>16</td>
</tr>
<tr>
<td>Days of fieldwork</td>
<td>150</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>13</td>
<td>15</td>
</tr>
</tbody>
</table>

Agroforestry practices found
During the inventory many cultivation practices were found. Most of them were some kind of shifting cultivation practice. We have here chosen not to implement them in the report with some few exceptions. The reason for that is that we think they are based on the same strategy and are quite well described already and that we with this inventory more want to describe other practices rather than the “traditional” shifting cultivation. Shifting cultivation in different forms is however the most common system in the districts inventoried. Some of the practices described are also based on a shifting cultivation system with rice, like e.g. improved fallow practices.

Other agroforestry practices then shifting cultivation where found, but it has been difficult to label each of them since they often are integrated and are a part of a bigger farming system. But, anyway we have tried to sort them and in one way label them. In Ponxai we found and described eleven practices and in Namo thirteen. A detailed description of each one of these practices will soon be published in Lao language at the National Agricultural and Forestry Institute. In this workshop paper only the main directions and most interesting practices are briefly described, just to give an expression of what kind of practices that are used and accepted by the farmers in these two districts.

Ponxai district, Luang Prabang Province
Ponxai district which is in Luang Prabang province is dominated of a mountainous landscape and the natural forest can now only be found on the very steep slopes. There are today very few roads and the access to the district is very limited. Today there is more or less only one recently newly build road into the district. In this area five main categories or practices could be found and they are Home gardens, Livestock practices, Entomoforestry, Fishponds and Intercropping and Rotational practices.

Home gardens
In Ponxai district it seems like home gardens, fruit gardens and orchards etc is quite well known and wide spread. There are many examples of these kinds of gardens and they are found in almost all villages visited. In villages which are newly relocated and with many
newcomers the amount of home gardens are fewer. Especially gardens were fruit trees plays an important role is difficult to find.
In general a home garden in Ponxai district is between 0.25 – 1 ha big and you can usually find fruit trees, like papaya, banana, citruses and jackfruit. Other crops which are common are different kind of vegetables and fruits like eggplants, chili, cabbage, beans and pineapples. In one home garden in Huay doy, a hмонg/khamu village high up in the mountains more than 50 different plants were grown (see picture 2). Often these plants are mixed with each other or in one way rotated within the garden. Most of the home gardens have a living fence of various species (see picture 1). Some gardens have fences made of cut bamboo or a mix between living and bamboo fences. Common is that you see chicken and sometimes even pigs inside the fence. This is not preferred by the farmers since they claim that the animals destroy their crops and eat their fruits. Common are also various kind of medicine plants, especially in the older gardens. The home gardens observed were situated in all kind of environments from on top of the mountains down to close to the rivers. Mainly the gardens were relatively flat located and close to the village houses.

Some home gardens are also mixed or intercropped with e.g. rice or corn. These gardens are often a little bit bigger than the “traditional” (>0.5 ha) home garden and you can’t really find the great variety of plants used as well. In this kind of gardens fruit trees as the one mentioned are common and planted often as contour along the boarders or scattered within the plot. Fences haven’t been observed in these gardens. Vegetables like cabbage, chili, tarot etc are common and grown mixed with the rice or corn.
Intercropping and rotational practices
Closely related to the relatively large home gardens are rotational systems or intercropping permanent systems, usually around one hectare big. Here the main focus is on some kind of grain crop like e.g. rice, Job’s tears or corn. In the rotational systems it is common to rotate crops during the year or between the years. Often organic fertilizers like peanuts are grown between the different periods of crops or mixed with e.g. corn. Some other vegetables like banana, sesame, tarot and chili could also be found within the area. Fences haven’t been observed around these kinds of fields. Trees observed in these systems are fruit trees like jackfruit and papaya and quite common is that teak trees are grown in the boarder or scattered around in the field. The teak is mainly used for home consumptions and the quality is rather bad with many branches and tops. These kinds of practices could mostly be found in the valleys quite close to rivers or in moist places with good soils.

Intercropped field could also be found. Here that means some kind of grain crop mixed with trees or other plants. One example is Job’s tear intercropped with paper mulberry.
(See picture 3), here the paper mulberry is probably naturally growing and spreads and regenerates by roots. It is cut down and harvested every second year. After that paper mulberry is harvested Job’s tear is planted and harvested during the year. In between the paper mulberry can continue re-growing and is when the Job’s tear is harvested already around one year old. This system gives crops every year with no fallow periods and as it’s seems sustainable yields. The paper mulberry practice was found in rather steep areas far away from the valley river. Other intercropped areas were though mainly situated more closely to rivers and streams.

Livestock practices
Practices with animals are common in Ponxai district, maybe the most common agroforestry practice. The most widespread and common livestock practice is free grazing livestock. Chickens and pigs are mainly grazing closely around the houses, in the home gardens and other nearby areas. Cows and buffalos are also free grazing around the villages but in a more extensive way. The animals feed themselves of what they can found in the fallows and forests. The management and organization of the animals with this system is very unclear and it seems like they are just let out free and then only sometimes gathered for reasons like slaughter or going to the market. Problems with this system are, according to our interviewed farmers, that the animals eat planted un-fenced crops, difficulties with observing the cattle, difficulties to know who owns the animals and finally that the animals grow quite slow and are very thin. The advantage is a very low labor intensive system, no ones needs to herd or take care of them. It seems quite common that farmers use the animals like investments. Instead of putting the money in the bank they buy cattle and raise them using this free grazing system.
Some villages also keep cattle fenced or herded. These systems vary but in general some farmers go together and build fences in fallow land where the cattle are set free inside. The reason for keeping them fenced is to protect cultivated crops from being eaten by the livestock. Therefore the livestock are only fenced during cropping seasons around 6 months a year, the rest of the time they are free grazing. A village can have several fenced areas within the village area it depends on how many cattle and farmers that are participating in this often cooperative practice. A fenced area is in the range of around 200 ha and holds about 40 animals. It should also contain preferred grasses, e.g. Imperata-grass, and a stream for fresh water, see figure 3. This way of keeping cattle could be classified like a fallow improvement practice, since the farmers said that after some years the fallow area will be a really good rice production site. Old fenced livestock areas were much preferred for growing rice if they were located close to the village. But relatively often these systems were practiced far away from the villages (probably close to their old villages), further up on the mountains. In the cases were no rice was planted the forest now are growing back according to the interviewed farmers. It seems like this cooperative way of fencing cattle mainly is done by Hmong-farmers and that the idea came with them when they moved down to the new villages along the roads. But, also Khamu-farmers now copied and organized own groups or even joined Hmong-farmers groups with this management system. This system is also used for raising goats. The main problem with goats is that they eat everything so it is very important that they are fenced during cropping season. But, the farmers said that at the same time this is a problem it is also an advantage since the fenced area can be relatively poor and bad and anyway the goat can graze.

Figure 3; Ban Huay maha villager’s sketch map over their fenced areas for cattle
Livestock is also raised in fenced areas directly in the “primary” forest. This system was found high up in the mountains in an old village where the pressure on land was less than close to the roads. Here Hmong-farmers organized in big groups around 40 persons and build a fence around an area of 1000 ha. Within that area around 200 animals could graze permanently. All families have a special ear mark for the cattle to keep them separated from other families’ cattle. There are some problems with wildlife mainly wild dogs (probably *Cuon alpinus*) attacking the animals so they have to be guarded or herded within the fenced area. Advantages with this system are protecting other crops from being grazed and that animals get fatter the farmers claimed. It was also much easier to keep them protected from wild dogs, tigers and other threats. Since the area was so big the farmers said that vaccinations etc weren’t necessary, as it is if you keep them in smaller areas. This system was very sustainable according to the farmers and they have now used this area and practice without any declines for ages.

**Fishponds**

In Phoxnai villages fishponds are common, especially in the older villages. Usually the ponds are surrounded by different vegetation for feeding. Common are e.g. banana trees, paper mulberry and lemon grass. The latest was planted to protect the fish from snakes which is seemed as one of the biggest problems with fishponds. The ponds varied between huge ones like 50*50 m to smaller ones like just 10*10. In the ponds various kind of fishes are raised and also clams or mussels can be found. The clams, which were really appreciated by the farmers, were big around 10-18 cm and 100’s of kilos could be collected during a year, from the bigger ponds at least. The clams were not introduced they just appeared after some time in the ponds according to farmers. The management of the fishpond is that some leaves from the surrounding trees are cut and put into the water which feed the fish. When fish is needed, for local use or for selling, fishing net is used. The clams are collected when diving and swimming in the pond. These systems seems very sustainable and useful for farmers to get there daily protein and also for getting cash, since some of them could sell fish on the markets. The biggest problems with fish ponds are to dig the actual hole which is very expensive or time consuming and when running, as mentioned already, snakes predate on the fish.

**Entomoforestry**

One practice was found that combines trees and insects; raising of stick lac. Stick lac is grown in some of the villages, probably the older ones. According to the farmers this practice was spread and common among the farmers in the old days, but today only few people practiced and knew about it. Today, also the places we heard about where it could be found were far up in the mountains, minimum one day of walking close to their old village. The stick lac was before used as glue or for coloring cloth and clothes. Today it is mainly used as glue for repairing tools etc. It is still considered as one of the absolute best materials to repair farming tools with. It could be grown in two ways either in the natural forests or in small plantation areas. In the natural forest the stick lac insects are introduced on branches on the Mai Faen (*Protium serratum*) trees. Other trees cold also be used but Mai Faen was the one that produced best and most stick lac. Preferred planting spots are on high altitudes since there are fewer ants there, which is one of the biggest problems when raising stick lac. Stick lac is introduced on new trees and
branches two times a year and one “normal” tree could produce around 100-200 kilo per year. The tree will belong to the person that infect it and you can come back to a tree every third year and infect it with lac insects. The other way of raising stick lac is to grow pigeon pea in an open field e.g. fallow land and then introduce the lac insect on the branches. Pigeon pea is according to the farmer a very good stick lac host, better then the Mai Faen but it is difficult to get seeds and you can only get one harvest per year compared with two for the Mai Faen. Nowadays when the demand for stick lac is low the way of planting plantations with pigeon pea isn’t practiced; it is enough of raising the lac in the wild forests according to the farmers in Phonxai.

Table 2; found and described agroforestry practices in Phonxai, Luang prabang Province

<table>
<thead>
<tr>
<th>Ponxai district</th>
<th>Practice</th>
<th>Village</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cattle raising in fallow (fenced)</td>
<td>Huay Maha</td>
<td>Livestock</td>
</tr>
<tr>
<td>Luang Prabang</td>
<td>Goat raising in fallow (fenced)</td>
<td>Huay Maha</td>
<td>Livestock</td>
</tr>
<tr>
<td>Province</td>
<td>Farming system with trees and veg.</td>
<td>Huay Maha</td>
<td>Intercropping pr</td>
</tr>
<tr>
<td></td>
<td>Rotational system with veg. + trees</td>
<td>Huay Maha</td>
<td>Rotational pr</td>
</tr>
<tr>
<td></td>
<td>Job’s tear and Paper Mulberry</td>
<td>Huay Maha</td>
<td>Intercropping pr</td>
</tr>
<tr>
<td></td>
<td>Rotational farming system</td>
<td>Huay Maha</td>
<td>Intercr/Rota pr</td>
</tr>
<tr>
<td></td>
<td>Home garden with grain crops</td>
<td>Huay Man</td>
<td>Homegarden</td>
</tr>
<tr>
<td></td>
<td>Home garden</td>
<td>Huay doy</td>
<td>Homegarden</td>
</tr>
<tr>
<td></td>
<td>Cattle raising in forest (fenced)</td>
<td>Huay doy</td>
<td>Livestock</td>
</tr>
<tr>
<td></td>
<td>Fishpond with tree feed</td>
<td>Nam bho</td>
<td>Fishpond</td>
</tr>
<tr>
<td></td>
<td>Stick lac raising</td>
<td>Nam bho</td>
<td>Entomoforestry</td>
</tr>
</tbody>
</table>

Namo district, Odomxai province

Namo differs from Ponxai in many ways. Geographically it share boarder with China, which probably opens up market opportunities. The landscape is hilly but not really steep as in Ponxai. The infrastructure also differs and you can find several roads and it is easier to find access to the district. However, there are also villages which can not be reached by car. Rather big forests can be found within the district. In Namo thirteen practices have been found and described and they could be organized in six main categories which are; Livestock practices, Advanced farming systems, Homegardens, Rotational and intercropping practices, Improved fallows and NTFP-plantations.

Livestock practices

As in Ponxai livestock plays an important role in the village livelihood systems. The most common is free grazing and also here the animals seem to walk around without any form of controlled management system.

An interesting livestock practice found is a goat farm where goats are held permanently in a fenced area of around 50 ha, see picture 4. Within that area around 100 goats are fed, but the farmers think that the number can be increased. From the beginning the area chosen were old fallow but now it is permanently grazing land. However, the goats are rotated within the total area so that the land can rest and recover from the pressure of the goats. To ensure that the animals have fodder enough Pigeon pea is planted, which it seems like the goats really like to eat. Today it is mainly short vegetation but according to
the farmers they now observe that the forest trees now are coming back in the unused areas. In some years time probably the goats will graze in the forest. Today six families work together with this goat farm and they have all stopped with growing rice since some few years back. They now totally rely on the incomes from the goats, which they mainly sell on the local markets.

**Picture 4; Goat farm in Ban Na Noi of the Ban Huay Kok Fart, Namo District**

**Home gardens**
The tradition of having home gardens in Namo district is well known and spread. In almost every village there is some kind of home garden. They are often based on fruit trees, like citruses, jack fruit, mango and papaya. Within the garden crops like tarot, peanuts, gingers and medicinal plants are grown. Some gardens contained up to 20 different species. In one village, Ban Kuang, home gardens were based on planted bitter bamboo, see picture 5. Bitter bamboo stems were collected from the surrounding forests and planted in the home gardens close to the houses. Between the bamboo stems several species then were planted like e.g. pineapple and fruit trees. Within these bamboo home gardens also vegetables, medicinal plants and other crops were grown.
Advanced farming systems
For some farmers the home gardens seem to have developed to larger gardens containing several important production factors, we here call these gardens advanced farming systems. These relatively advanced farming systems contain firstly different plants like teak, fruit trees, several vegetables and crops like rice, corn and cassava. Secondly the systems also contain protein sources like fish ponds, pigs and poultry. All factors depend and make use of each other to be able to function. In one example from Ban Nathong a fishpond is the base for the system and other production units supply the fish with food, like e.g. pigs, banana, rice husk, corn and cassava. These systems seem very productive and efficient but they are complicated to run and you need a lot of investments and available land to start it up, especially if it should contain a fishpond.

Improved fallow
In Namo district farmers never really plan for fallow improvement but the way they manage their land and fallow gives some preferred species in the fallow anyway. Most common is the growth of different cardamoms during the fallow period. Green cardamom for example grows best in a fallow area, it needs light. Three years after rice harvest the green cardamom could be harvested in the fallow. Harvesting can go on for two years before the land had to be clear again. If the fallow would grow older also the green cardamom would disappear as the woody vegetation would take over. For red cardamom it is the opposite since it seems to prefer shaded environments. Since red cardamom is very valuable farmers now let fallows grow into forests to create environments for the specie. After ten years fallow often red cardamom can be harvested and the area is in one way transformed to a NTFP-plantation. To keep the area as a cardamom production area thinning of big trees occur. Where this now have take place and the areas are ten years or
more the actual production generates more than it would have done if it still would have been a traditional upland rice field.

**NTFP-plantations**

Red cardamom fallow production is one example of a NTFP-plantation. Another interesting NTFP which successfully have been transformed to a plantation crop is bitter bamboo. The knowledge of planting bitter bamboo was mainly found in only one village, Ban kuang where they also plant it in their home gardens. The planting started for around 30 years ago and at that time it was planted directly in the secondary forest. These plantations are still ongoing and during the years several new ones have been established. When establishing them they are often intercropped with pineapple the first years. Today plantations up to one ha big can be found. Also other bamboo species are planted in plantations, often like boarder plantations between rice fields (picture 6). These bamboos are used for several things like shoot production, handicraft and construction purposes.

*Picture 6: bamboo planted as boarder plantations between rice fields*

**Rotational and intercropping practices**

In Namo no rotational or intercropping practices without fallow could be found. But, the knowledge of intercropping and the use of rotational practices with some years fallow are widely spread around the district. These practices could be seen like some kind of “advanced” shifting cultivation and the base is also most often rice or corn. The other crops are mostly vegetables such as, tarot, pumpkin, cucumber, eggplants and chili but cotton and in some places tobacco seems to play important roles. Fallow periods vary between villages but it seems like they can be shortened without any declines in
production in some cases. But, this assumption has to be more looked into before it could be said for sure.

Table 3; Found and described agroforestry practices in Namo district, Odomxai province

<table>
<thead>
<tr>
<th>Namo District</th>
<th>Practice</th>
<th>Village</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Odomxai</td>
<td>Goat farms in fallow and forest</td>
<td>Ban Na noi</td>
<td>Livestock practice</td>
</tr>
<tr>
<td>Province</td>
<td>Farming system with fishpond</td>
<td>Ban Na tong</td>
<td>Adv. farming system</td>
</tr>
<tr>
<td></td>
<td>Imp fallow with green cardamom</td>
<td>Ban Mixay</td>
<td>Improved fallow</td>
</tr>
<tr>
<td></td>
<td>Imp fallow with red cardamom</td>
<td>Ban Mai na taw</td>
<td>Imp. Fallow/NTFP-plantation</td>
</tr>
<tr>
<td></td>
<td>Fruitgardens with cassava</td>
<td>Ban Mixay</td>
<td>Home garden</td>
</tr>
<tr>
<td></td>
<td>Crop rotation</td>
<td>Ban Mai na taw</td>
<td>Rotational crop. Practice</td>
</tr>
<tr>
<td></td>
<td>Bitter bamboo plantation</td>
<td>Ban Kuang</td>
<td>NTFP-plantation</td>
</tr>
<tr>
<td></td>
<td>Bitter bamboo homegarden</td>
<td>Ban Kuang</td>
<td>Home garden</td>
</tr>
<tr>
<td></td>
<td>Bamboo boarder plantations</td>
<td>Ban Ai</td>
<td>NTFP-plantation</td>
</tr>
<tr>
<td></td>
<td>Rotation rice cotton system</td>
<td>Ban Nam tong</td>
<td>Rotational crop. Practice</td>
</tr>
<tr>
<td></td>
<td>Shifting cultivation rotational practice</td>
<td>Ban Nam tong</td>
<td>Rot./Intercr. practice</td>
</tr>
<tr>
<td></td>
<td>Farm. system with veg, trees and NTFP</td>
<td>Ban Namo neua</td>
<td>Intercr./adv FS practice</td>
</tr>
<tr>
<td></td>
<td>Shifting cultivation with long fallows</td>
<td>Ban Muu tuu</td>
<td>Trad. Shifting cultivation</td>
</tr>
</tbody>
</table>

Conclusions

Finally we would like to highlight five points:

- The first one is the use of livestock agroforestry practices. Livestock raising is common in different forms both fenced and non-fenced. Not much is today known about the indigenous ways to raise cattle and other animals. Still many secrets are there but for sure raising livestock in various forms is accepted and liked by most villages and farmers. Probably sharing of the indigenous knowledge about livestock between farmers could gain the local production systems. Livestock production seems to have a great potential in the upland if managed properly.

- The second point is the use of home gardens and advanced farming systems. Simple home gardens containing vegetables, trees and some other plants are common and under continuous improvement by the farmers themselves, new species are tested and evaluated as soon as they appear. Here further improvements seem quite unnecessary since the farmers probably know best how to create and manage home gardens. When looking into the more advanced home gardens, advanced farming systems, the indigenous or local knowledge seems much less and undeveloped. These practices need often good land and a lot of investments but when established they seem very productive and sustainable.

- This leads into the third point which is the fishpond system. In one way they are similar to advanced farming system practices and can also be the base in such a system. Fishponds seem highly appreciated by farmers since it produce proteins for the household and also cash if the fish can be sold. But, fishponds are
expensive and complicated to build for a farmer. More help and research on new ways to deal with these problems is needed.

- Fourth point is considering the knowledge, or lack of it, about intercropping and rotational systems. These practices are relatively new and undeveloped. Here sustainability and production aspects must be better known. Intensive research on finding crops that could grow together, especially without fallow periods is essential if practices like this will be an option for farmers.

- The fifth point we would like to highlight is about NTFP-plantations. This seems like a field with high potentials and necessary if an increased production of NTFP will continue. Today the knowledge is limited and the practice is not widespread but there are some interesting examples of successfully NTFP plantation, which probably could be followed by others. More research on potential NTFP for plantations could probably generate important upland cropping options for farmers.

References

Anon. 2001b Inventory of Indigenous Agroforestry Practices – A Training Course. Thong Khan Agroforestry Research Station, Forestry Research Centre NAFRI

Ankarfjard R., 1998 Possibilities for improving the economy of forest communities through extraction of non-timber forest products. Stockholm University. Stockholm


Sodarak H., 2000 Shifting cultivation practices in Lao PDR. Swedish University of Agricultural Sciences. Uppsala